

THE IRON AGE

THURSDAY, JUNE 4, 1891.

The Erie City Automatic Steam Engine.

The automatic cut-off engine which is here illustrated is made from entirely new designs and patterns by the Erie City Iron Works of Erie, Pa. The beds are well proportioned and strong, and are provided with new patent pillow blocks or main bearings, which have square surfaces with an improved form of gib, to allow for taking up the wear.

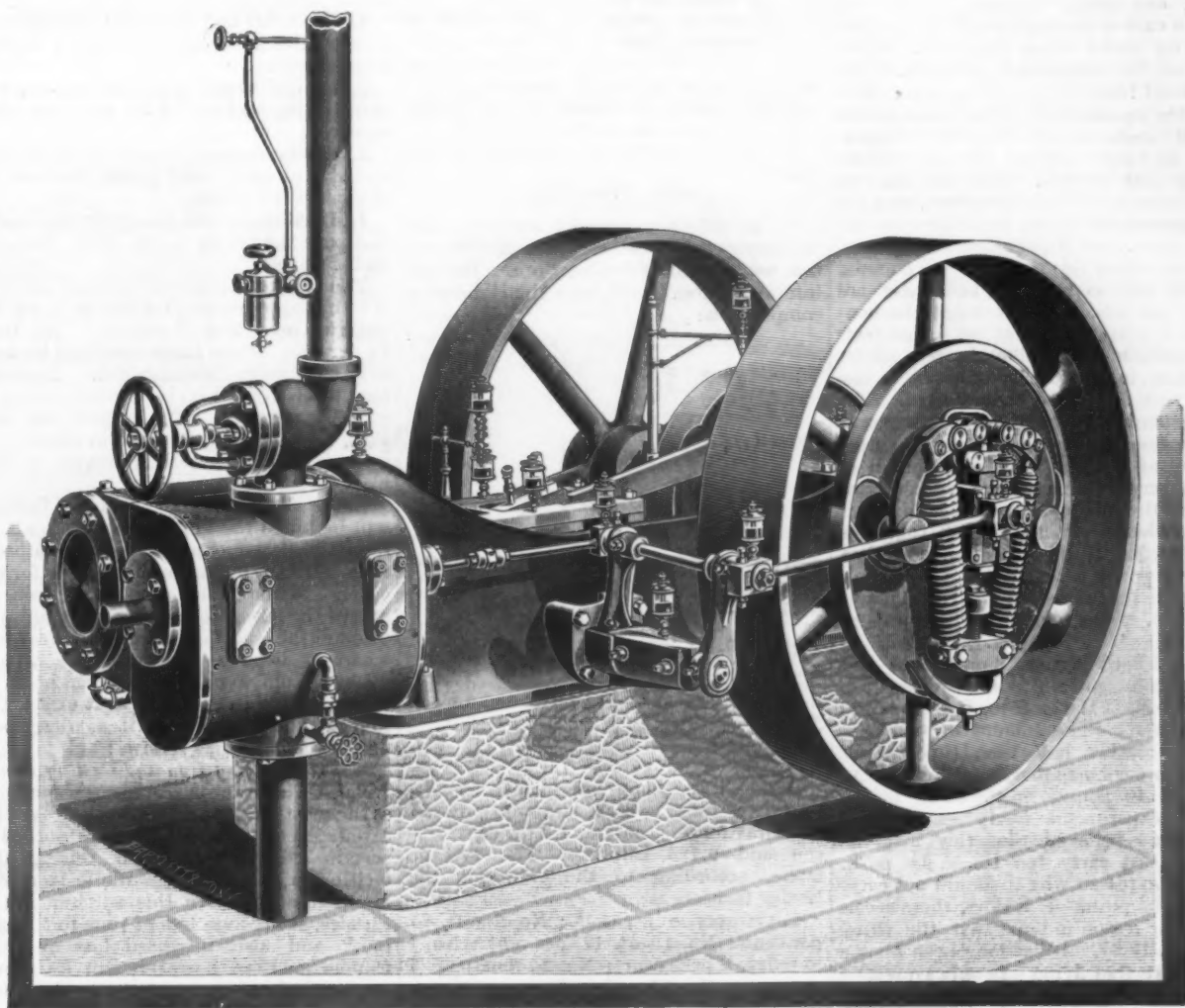
The gib is adjusted by a set screw tapped through the solid bed and provided on its inner end by ball and socket

error is very sensitive and insures close regulation. The construction of the governor will be readily understood by consulting the engraving, which brings out all the details very clearly. The eccentric rod is driven from an eccentric pin, instead of the usual eccentric and strap. The eccentric pin is carried by a block similar to a crosshead, and which is fitted to be moved in suitable guides. The eccentric pin thus moves on a radial line. The distance of the pin from the axis of the shaft—and thereby the travel of the valve—is regulated by the weighted levers, whose throw is controlled by the springs. The tension

Maxim's Flying Machine.

Hiram Maxim has in a letter printed in the daily press furnished data relative to his flying machine. He says:

My apparatus consisted of a long arm mounted in such a manner that it would turn freely around a circle 200 feet in circumference. The arm was accurately balanced, secured by wires in every direction so that it could neither tip nor twist, and was made very sharp so as to cut the air very easily. I attached a small flying machine to the end of this arm, with the screw shaft perpendicular to the arm, and to this



AUTOMATIC ENGINE, BUILT BY THE ERIE CITY IRON WORKS.

joint, to allow for perfect adjustment. This steam chest is made detachable from the cylinder. The valve is large and simple in its construction, is provided with water grooves for packing, is accurately fitted and perfectly balanced. The water packing avoids the use of packing rings or springs, which are more or less liable to get out of order and cause trouble, besides taking a great deal of power to move, and putting unnecessary strain on the governor.

The governor plate is strong and heavily ribbed on the back, and the springs are arranged close to the plate to avoid undue vibration. The adjusting screw is placed on the same side of the plates as the weights, which brings all the strains in one plane, with the result that the gov-

of the springs can be adjusted by means of an adjusting screw passing through a block, uniting their lower ends. The piston rods are fitted by screwing them into the crosshead with United States standard threads, having jam nut to check up behind. This obviates the keying of the eccentric rod and crosshead, which not infrequently causes trouble when the key is driven too far down. The piston is also secured on the rod by United States standard threads, and the ends of the rod are riveted over. The rocker is made with a take-up gib on one side, and has two strong arms, through which a steel shaft is passed. The engine is well built and well proportioned throughout, and is said to be one of the best high-speed engines now on the market.

shaft I attached small wooden screw propellers. This shaft could be driven at any required speed, and was mounted in such a manner that the push of the screw and the power required to drive it could be accurately obtained. Attached to the same machine was a peculiar articulated movement to which I attached planes of different shapes and at different angles. Suitable apparatus was also provided to measure with great accuracy the amount of weight lifted by these planes. The action of the screw was to drive the arm around the circle of 200 feet circumference.

On one occasion, when the plane was set at a very low angle, I think about 1 in 25, I succeeded in carrying 250 pounds to the horse-power, but I usually placed the planes at an angle of 1 in 14—that is, when-

ever the plane advanced 14 feet it pushed the air down 1 foot. In this case the lifting power was always just 14 times the push of the screw. The skin friction on the plane was so very small that it was immeasurable. When the planes were worked at this angle they carried 133 pounds to the horse-power, and at high speed lifted about 8 pounds to the square foot. The speeds experimented with varied from 30 to 90 miles an hour. These experiments were conducted with the most delicate and accurate apparatus, and the data obtained may be considered as thoroughly reliable.

So much for the small machine. In regard to the large machine, this weighs complete 4000 pounds, of which 1800 pounds is in the engine and steam generator. If to this we add 400 pounds for two men, 500 pounds for petroleum and 500 pounds for water we shall have a total weight of 5400 pounds. The engines are two in number, each one having two cylinders, one being balanced against the other in such a manner that there is absolutely no shake when they run. They work on the compound principle, steam being used from 200 to 350 pounds pressure to the square inch. The steam generator is made on an altogether original plan. It weighs without the casing about 350 pounds, while the engines weigh exactly 300 pounds apiece, and the casing about the boiler, together with the steam pipes, screws, shafting and pump, bring the whole motor up to 1800 pounds. The fuel used is gasoline, and there are 45,000 gas jets, in what might be considered a grate surface of 40 square feet. The generator has 48,000 brazed joints, and when tested to 900 pounds to the square inch not one of them leaked. The total amount of water in the generator at any one time is about 2 gallons. Distilled water is used. The machine is provided with a very light condenser, which forms a part of the kite and which it is found is very efficient. It is believed that this will condense all the water if no more than 150 horse-power is required.

At a late test of the engine, the machine being tied, it was found that the push on the machine with 200 pounds pressure of steam and both engines running was just 1000 pounds, and the power developed in useful effect on the machine itself was 120 horse-power. The amount of fuel consumed is rather less than 1 pound of petroleum per horse power per hour. As a push of 10 pounds on the screw in the original experiments easily carried 140 pounds, it is believed that this machine will at least carry ten times its push. There is no reason why it should not carry 14 times its push. If it does, there seems to be some reason to hope that the thing will actually fly. It has long been known to scientists that flying was only a question of obtaining enormous power and light weight, and this I have already obtained, as will be seen, as there can be no question of the accuracy of the figures.

The financial collapse of the American Export and Trading Company is one of the curious occurrences of the times. This event followed the sudden death in this city of Edward H. Goff, who gave the concern a nominal existence, and succeeded in convincing many persons of the genuineness of the scheme as a business enterprise. Although its assets, on paper, were reckoned at \$1,000,000 or upward, the entire tangible property found consisted of little more than an office desk and two safes. So called valuable "concessions" from Mexico, Ecuador and other countries prove to be for the most part imaginary.

Canada's fisheries product in 1890 is officially stated to have been valued at \$17,715,000.

SOUTHERN STEEL.

THE DUPLEX PROCESS DISCUSSED

The manufacture of steel from home product is the achievement which is now looked upon as the ambitious aim of Southern iron makers. The movement to establish a steel plant at Ensley, near Birmingham, Ala., has attracted considerable attention in the South, and has brought out at least one contribution to the literature of the subject, which we cannot allow to pass unchallenged, since it seems to carry considerable weight, and may therefore do some harm.

G. L. Luetscher, chemist of the Tennessee Coal, Iron and Railroad Company, at Ensley, Ala., has published in the Birmingham *Daily News* an article in which he puts forward estimates of cost of product and of plant which are very misleading. The data which we present are the results of the experience of one of the leading mill managers in this country, who has had an extended experience with the basic process and has studied it abroad, having visited every leading works on the Continent.

We quote from Mr. Luetscher's paper as under.

Raw Material.

"The only raw material available and practically inexhaustible is the Red Mountain ore, especially the hard ore. The pig iron made from it will have the following composition:

Grade.	Graphitic carbon.	Combined carbon.	Silicon.	Sulphur.	Manganese.	Phosphorus.
Silver gray	3.13	0.02	5.5	Trace.	0.25	0.68
No. 2 soft.	3.48	0.03	3.5	0.004	0.26	0.68
No. 1 soft.	3.53	0.03	3.5 to 4.0	0.005	0.27	0.68
No. 1 foundry.	3.49	0.07	2.8 to 3.5	0.005	0.25	0.68
No. 2 foundry.	3.55	0.07	2.2 to 2.6	0.024	0.22	0.68
No. 3 foundry.	3.48	0.10	2.0 to 2.4	0.025	0.21	0.64
Gray forge	3.00	0.57	1.3 to 1.7	0.045-0.070	0.19	0.64
Mottled.	2.11	1.22	1.1 to 1.6	0.125	0.14	0.64
White.	0.10	2.62	0.7 to 1.2	0.300	0.10	0.64

Besides these, some "off grades are made, like silver mill," which, although graded as "gray forge," contains 4.5 per cent. silicon and 0.125 sulphur. The average make, according to the grades, at the Ensley furnaces is:

Silver gray, 8 per cent.; No. 2 soft, 15 per cent.; No. 1 soft, 12 per cent.; No. 1 foundry, 2 per cent.; No. 2 foundry, 7 per cent.; No. 3 foundry, 9 per cent.; gray forge, 33 per cent.; mottled, 13 per cent.; white, 1 per cent. or less.

This will bring the average composition to about 2.75 to 3 per cent. silicon, 0.055 to 0.060 sulphur.

Attempts have been made to reduce the amount of silicon without increasing the sulphur, without great success. The only means of doing this to some small extent is to crush the hard ore finer, mix it thoroughly to make it more uniform and add some lime to it. The finer shape will permit more "gas" reduction instead of "direct coke" reduction; the greater uniformity will permit the addition of lime without danger of "liming-up" the furnaces. The four furnaces at Ensley can, when properly managed, produce 120 tons of pig iron a day per furnace. The blast furnaces could be run so as to be tapped at regular alternating intervals to furnish 30 tons of fluid pig iron every 90 minutes in three 10-ton or four 7½-ton ladles. The saving in avoiding the pig iron to be cast

into pigs and all the further handling, including expenses of selling, &c., would probably amount to 65 to 75 cents per ton (as 3 per cent. of scraps would also be avoided). The furnaces could thus furnish fluid pig iron at a minimum price.

It is evident from the average composition of the pig iron that such iron is not directly fit to be used in a basic open-hearth steel furnace, the only place, though, where its medium phosphorus contents will permit its conversion into steel. Its high silicon would corrode every basic lining at once. The silicon must therefore be first removed in an acid Bessemer converter.

It may be stated here that it will never be possible to make basic pig iron direct from any Red Mountain ore, because the ore contains only ½ per cent. of manganese and too much silica.

Methods Proposed.

There are four possibilities to make steel out of Ensley pig iron, viz., to:

1. Desilicize metal, bought as pigs, cast it into chills and make steel out of chilled blown metal.
2. Desilicize metal, bought as pigs, and pour the blown metal fluid into the steel furnaces.
3. Desilicize metal, bought in fluid state, cast it into chills and make steel out of chilled blown metal.
4. Decilicize metal, bought in fluid state, and pour the blown metal fluid into the steel furnaces."

The pig iron, as shown by these analyses, is rather unpromising for use as stock for the basic open-hearth process. At least 14 per cent. of the make could not be used even after being Bessemerized. It would have to be worked up by careful mixing in small quantities. With proper care and skill, its average quality as to silicon and sulphur could be much improved by the blast furnace manager.

In the work done at the blast furnace will be found the key to success both in the basic Bessemer and open-hearth processes. It is as important for one as for the other. Without the proper pig iron required by the process to be employed commercial success cannot be reached, whatever *tours de force* may be accomplished from a purely technical point of view. Taking the pig iron as it exists, the four methods of utilizing it as described may be discussed as follows:

No. 1.—*Melting Iron and Casting Blown Metal.*—This is the most expensive method, as the most work is done and the least fuel saved. There would also be absorbed a certain amount of sulphur during the melting in the cupola. While it is not impossible to remove this sulphur in the furnace, it involves loss of time in "melting," and also increased loss of iron. Cupola melting, however, will be necessary for at least a part of the product, unless sold as pig iron.

No. 2.—*Melting Pig and Transferring Blown Metal.*—This method would greatly increase the danger of absorbing sulphur while in the cupola, because the transfer of the molten blown metal would involve a high initial temperature in the converter. This means more fuel in the cupola, and, of course, more sulphur to be absorbed.

No. 3.—*Direct Bessemer and Remelting Open Hearth.*—It is quite possible that this may, in the end, prove to be the most economical of the four methods of procedure. All danger from loss from chilling in the transfer ladle would be avoided, and an opportunity would be given to insure the best results by properly mixing the open-hearth charge.

No. 4.—*Direct Bessemer and Direct Open Hearth.*—This, of course, is the most fascinating and attractive of the methods. If it can be successfully carried out and made to give uniform results in the finished product, it will certainly be the best and

cheapest of the four alternatives. It means, in the first place, that the work done at the blast furnace must be of the

with mine, set down in an additional column, and will then give my reasons for the difference:

Cost of Desiliconizing Direct Metal.

Items.	Luetscher.		Corrected.	
	Amount per 24 hours.	Cost per ton.	Amount per 24 hours.	Cost per ton.
500 tons of liquid blast-furnace metal at \$10.....	\$5,000.00	\$11.111	\$5,000.00	\$11.111
Labor for 24 hours.....	70.00	.156	360.00	.80
Steam.....	20.00	.044	63.00	.14
Repairs, interest, &c.....	85.00	.188	275.00	.61
General charges.....			54.00	.12
Royalty.....			450.00	1.00
450 tons desiliconized metal, equal total.	\$5,175.00	11.499	6,302.00	13.781

highest class. The product must be kept regular within very close limits, or else a system of mixing must be provided, similar to that employed at Edgar Thomson. This is essential. Without extreme regularity of stock no one can do good work in making high quality of steel in either the basic Bessemer or open-hearth processes. The only alternative is an opportunity to properly select and mix the stock before it goes into the furnace.

Certain practical difficulties are involved in the transfer of the molten metal from the converter to the open-hearth furnace. The greatest of these is the liability to chilling or "skulling" in the transfer ladle. The oxidation of the carbon and silicon which takes place in the converter, as proposed in this process, is hardly carried on far enough to replace the heat lost by pouring into the converter, changing the graphitic to combined carbon, absorption by the walls of the converter, pouring into the transfer ladle, transferring to the furnace, and finally pouring the metal into the latter. A large amount of heat will be lost from each one of these courses. Experience has shown that if a heat be tapped from a cupola, poured into an open-hearth furnace, heated therein as hot as possible in say two hours, tapped into a ladle, and then poured into a vessel, it will not be as hot as if it were poured into the vessel direct from the cupola ladle.

There will always be great danger of loss from chilling in the transfer ladle. This was one, if not the principal, reason why the two-vessel duplex process was abandoned at Witkowitz. This is the rock on which this process is most likely to make shipwreck. It is quite possible that in the end it may be made to work successfully, but it means hard work, much lost time in the beginning, and a very large item which must be charged to "experience account."

If, however, it can be made to work smoothly, without excessive delay or "skulling," and if as good steel can be as regularly made by it as by the third plan, then the saving effected would pay for a very large expenditure in working it out. The expenditure for experience would, however, be certain to occur.

The Cost of Production.

Our correspondent deals as follows with the estimates of cost of producing ingots and billets: In order to desiliconize 500 tons of pig iron in 24 hours—a heat of 10 tons being the basis—there must be made 50 blows, or one every 28.8 minutes. This is, of course, a rate easily attained, but it would require two vessels in use at the same time to insure doing so with regularity and certainty.

In criticising the estimates of cost I will in each case give his table of costs

At \$70 per 24 hours for 450 tons of desiliconized metal, the labor cost per ton would be 15.6 cents. This seems to me absurdly low. As compared with the ordinary Bessemer process, the items of labor which would be saved by the use of direct metal and by charging liquid metal into the furnace are as follows: 1. Unloading pig iron, 5 cents; stocking and running the cupola, 2 cents; unloading coke, $\frac{1}{2}$ cent; pit labor, 13 cents; proportion of cleaning up, say 5 cents. This makes a total of 25.5 cents.

In an acid Bessemer plant converting 500 tons of pig iron the labor was \$1.45

Cost of Desiliconizing Cupola Melted Metal.

Items.	Luetscher.		Corrected.	
	Amount per 24 hours.	Cost per ton.	Amount per 24 hours.	Cost per ton.
500 tons of pig iron at \$10.75	\$5,375.00	\$11.944	\$5,375.00	\$12.185
Labor for 24 hours.....	95.00	.211	437.00	.991
Steam.....	20.00	.044	72.00	.163
Repairs, interest, &c.....	85.00		277.00	.628
60 tons of coke at \$2.50.....	150.00	.333	150.00	.34
General charges.....			54.00	.122
Royalty.....			441.00	1.00
Luetscher's estimate, 450 tons.....	\$5,725.00	\$12.72		
My estimate, 441 tons.....			\$6,806.00	\$15.43

in 1883. I do not think much improvement has been made in this respect since then, beyond what comes from increased product. Say, however, that improvement in design and appliances has reduced the cost to \$1.30. If 38.5 cents be taken from \$1.30 it leaves 91.5 cents, say 90 cents. It is possible that the reduced wear and tear on the vessel linings might reduce the labor 10 cents more. I do not think this would be the case, but I wish to give the benefit of all doubt. This would make the cost of labor for desiliconizing 80 cents, instead of 15.6 cents, per ton of metal.

With steam at \$20, the cost per ton would be 4.4 cents. This is too low. With coal at 90 cents per ton, steam costs 14 cents per ton on 500 tons treated. I see no reason why this should be much less, if any, in the proposed process, unless coal is cheaper.

Interest and repairs at \$85 per 24 hours means 18.8 cents per ton. Taking his figures for the smaller plant proposed (\$100,000), the interest and amortization would be \$10,000 per year, or \$33.34 per working day. This would be 7.4 cents per ton.

Refractories cost 21 cents per ton in an acid Bessemer treating 500 tons per 24 hours. Allowing for decreased wear and tear, due to not completing the "blow," this would certainly amount to 16 cents for desiliconizing. The repairs would certainly amount to 38 cents, and most likely to more. The total of this item would then amount ($38 + 16 + 7.4 = 61.4$) to 61.4 cents per ton, instead of 18.8 cents.

All reference to the general charges has been omitted, although the Bessemer department would have to carry its share. The management would have to be very economical if this did not amount to at least 12 cents per ton. Of course these charges vary in every concern, but they must in all cases comprise at least superintendence, clerk hire, yard shifting, sundry freights, laboratory and stationery. Royalty has also been omitted. In my opinion there can be no doubt that the association controls the patent covering the duplex processes, whatever may be the doubt as to what else it may own.

It is estimated that it would cost 20 cents per ton to put the liquid desiliconized metal into the shape of pigs. This seems to me to be too low. The labor alone would be 12 cents, and I think the chills would cost more than 8 cents per ton of metal chilled. I have taken 22 cents as this cost, but I am afraid this is too low. The desiliconized metal, cast in chills, would therefore cost \$11.70 on his estimate and \$14 on mine.

The above cost is based on a loss of 10 per cent. in the converter, or 450 tons of desiliconized metal per 24 hours.

All the remarks in regard to the first estimate apply to this one also. There are also the following additional errors: No allowance has been made for loss in the cupola. This would average at least 2 per cent. The additional labor required by the cupola has been put at 5 cents. I believe 17 cents to be a low figure. No allowance has been made for cost of running the cupola hoist. This would be at least 2 cents per ton. No increase has been made in the item of repairs, interest, &c. I think this would amount to $\frac{1}{2}$ cent at least. The general charges, remaining at the same aggregate, will be slightly increased. The royalty will be the same per ton. If the royalty be charged on ingots instead of desiliconized metal, this item would be slightly decreased.

The estimate of the capacity of the open-hearth furnaces seems to me sanguine, to say the least. I do not know any 20-ton acid open-hearth furnace which is today making three heats in 24 hours, even when working on 20 per cent. of pig and 80 per cent. scrap. Some of the 15-ton furnaces are doing as well as this. Of course the basic process is more rapid than

the acid process when working on the same kind of pig iron. That is, if the phosphorus in both cases is below 0.10 per cent., the basic furnace will turn out about 33 per cent. more steel. When the phosphorus is above this point the time required to make a "heat" increases, because the proportion of pig iron required is greater. The reason for this will be shown later on. There is no reason to suppose that chilled blown metal and scrap will work any faster than pig and

The loss in the furnace will be between 4 and 5 per cent. I have taken it at 5 per cent. for safety. The total cost of blooming is put at \$2. This is too low when scrap and oxidation are included. The oxidation loss will be about 2 per cent., and it will not be safe to count on less than 12 per cent. of scrap, the product being soft steel. The finished product obtained from 500 tons of stock will be as follows for the four different variations of the process:

Product.

	Stock.	Vessel charge.	Desil. metal.	O.-H. ingots.	Blooms.	Scrap.		Stock.	Vessel charge.	Desil. metal.	O.-H. ingots.	Blooms.	Scrap.
	100 per cent.	100 per cent.	90 per cent.	95 per cent.	86 per cent.	12 per cent.		100 per cent.	100 per cent.	90 per cent.	95 per cent.	86 per cent.	12 per cent.
4	500	500	450	428	368	51.36		500	500	450	428	368	51.36
3	500	500	450	428	368	51.36		500	500	450	428	368	51.36
2	500	500	450	428	368	51.36		500	490	441	419	360	50.28
1	500	500	450	428	368	51.36		500	490	441	419	360	50.28

scrap. In fact, the experience with Krupp washed metal, a very similar material, except as regards phosphorus, points to the opposite conclusion.

I know that a 15-ton heat of washed metal and scrap will take about one and a half hours longer to make than one of pig and scrap. The washed metal is much harder to melt than pig iron.

The costs of the desiliconized metal in the four processes proposed will be as follows:

		Luetscher.	Corrected.
4	1 ton direct blast-furnace metal, liquid desiliconized metal.....	\$11.50	\$13.78
3	1 ton direct blast-furnace metal, chilled desiliconized metal.....	11.70	14.00
2	1 ton remelted pig iron, liquid desiliconized metal..	12.72	15.43
1	1 ton remelted pig iron, chilled desiliconized metal	12.92	15.65

I have no very accurate figures on the cost of basic open hearth ingots in this country. I think, however, that \$7 and \$8 would hardly cover the cost from liquid and solid stock to ingots. Of course this will depend largely upon the product of the furnace. I do not believe that in the present state of the art more than 13 heats with solid stock or 18 to 19 heats with liquid stock can be made per week per furnace. In my opinion \$8 per ton for liquid and \$9 per ton for solid stock would be much safer figures to take for

Cost of Ingots.

		Luetscher.	Corrected.
4	Liquid blast-furnace metal, liquid open-hearth stock..	\$18.50	\$21.78
3	Liquid blast-furnace metal, solid open-hearth stock...	19.70	23.00
2	Remelted pig iron, liquid open-hearth stock.....	19.72	23.67
1	Remelted pig iron, solid open-hearth stock.....	20.92	24.65

estimating purposes. The lower figures might eventually be reached.

On this basis the cost of ingots by the four different processes would be as above.

In the above table the weights are all in tons, the losses on which, it is calculated, are as follows: Two per cent. cupola loss, 10 per cent. vessel loss, 5 per cent. open-hearth furnace loss, 12 per cent. crop ends in blooming mill and 2 per cent. loss from oxidation in the blooming mill. The cupola loss has been ignored in the calculations of the *Daily News* article, and the others are not given, although probably calculated upon.

On the above basis the cost of the metal in 1 ton of finished product, blooms, slabs or billets, will be as follows:

Cost of Metal in 1 Ton of Blooms.

		Luetscher.	Corrected.
4	Liquid blast-furnace metal, liquid desiliconized metal..	\$19.98	\$23.79
3	Liquid blast-furnace metal, solid desiliconized metal..	21.38	25.31
2	Remelted pig iron, liquid desiliconized metal.....	21.95	26.01
1	Remelted pig iron, solid desiliconized metal.....	22.88	27.15

The cost of blooming is put at \$2 per ton. This I take to be the cost of operating alone, the loss being ignored. I do not believe the operating cost of blooming, the scrap not being counted, can be kept much, if any, below this figure when the mill is to be run on varied product. On 7-inch blooms or heavy slabs this cost would be much lower. In fact, it would be much lower if the mill could be designed for any one class of product and kept to it.

Total Cost of 1 Ton of Blooms.

		Luetscher.	Corrected.
4	Liquid blast-furnace metal, liquid desiliconized metal..	\$21.98	\$25.79
3	Liquid blast-furnace metal, solid desiliconized metal..	23.38	27.31
2	Remelted pig iron, liquid desiliconized metal.....	23.95	28.05
1	Remelted pig iron, solid desiliconized metal.....	24.88	29.15

When this \$2 per ton is added to the cost of the metal in 1 ton of finished product the total cost for each variation of the process will be as above.

My estimates of cost are based on ordinary labor at \$1.10 for 10 hours; cupola foreman, at \$4.50 for 12 hours; vessel foreman, \$4.50 for 12 hours; pit foreman, \$3.25 for 12 hours; melter, \$5 for 12 hours; heater, \$3.50 to \$4 for 12 hours, and roller, \$4.50 for 12 hours. The tonnage basis for these rates is 150 tons of blooms in 12 hours.

The product basis is 500 tons of metal from the blast furnace in 24 hours. Coal is taken at 90 cents at the works and coke at \$2.50. From these data any one can make a comparison which will be correct for the rates and prices which can be maintained at Ensley. Five hundred tons of metal treated would mean 25 open-hearth heats every 24 hours. If each furnace only made one heat per turn 12 furnaces would be required to be in operation. If each furnace made a heat every eight hours, then eight furnaces would be required to be in operation. With six furnaces in operation each furnace would have to make 4.16 heats per 24 hours. This latter is, I think, a larger output than can be expected. There should be at least one reserve furnace.

In calculating the probable profits, the item of freights seems to have been neglected. I doubt if 300 tons of finished blooms per day could be sold in the immediate vicinity of Ensley. If not, then new markets must be created or the old ones invaded. In either case the freight must be taken account of. Ensley would have the advantage in the South, Southeast, and Southwest, but at present the consumption in these regions is hardly sufficient to take up the whole of this product. Undoubtedly the product would be exceedingly well-fitted for all purposes in which soft steel is employed. The Darby process seems to be a success, and by means of it any grade of steel can be made. Open-hearth steel castings have been made by this process equal to the best made from the old acid furnaces.

Mr. Luetscher's remark that scrap will not be wanted is perfectly correct, but not for the reason given. The sentences, "No scrap is necessary at all for this continuous process, as the low-carbon metal will be obtained at will by longer blowing of the metal in the converter," and (further on), "If there is a little more silicon than usual, all that is wanted is a little more blowing in the converter," seem to me to contain the greatest mistake of the article, as far as my information and experience go.

The rapid work in the open-hearth department necessary for the amount of product estimated upon is based on the supposition that the carbon and silicon can be eliminated to a great extent in the converter, leaving a metal which is suitable for use in the furnace. The carbon and silicon can, of course, be eliminated by blowing; the mistake made is in thinking that the resulting metal will always be suitable for use in the furnace. It seems to be a perfectly established fact that phosphorus must be removed in the presence of carbon when the furnace is used; this being exactly the opposite to what takes place in the basic converter. All the information I have been able to gather together from the technical papers seems to fully bear out this point. All the English experts insist upon it, and the practice in America, so far as I know it, shows the same necessity.

If the carbon goes out first great waste of iron takes place from oxidation, and all the numerous troubles occur which are caused by a highly oxidized slag at the end of the "melt." What these are would be too much to explain here, but they will readily occur to the practical man. In practice they would certainly render the process a commercial failure, if not a technical one also. In order to prevent this oxidation, when the carbon is eliminated before the phosphorus, it is necessary to

"pig back," as it is called—that is, pig iron is added to the bath to increase the contents of carbon, which is again boiled out. Sometimes this must be repeated several times.

This expedient wastes time, and is expensive in every way. It is especially hard on the furnace, as it renders it necessary to keep it up to full heat for a long time. The most economical practice is to so proportion the contents of carbon and phosphorus that the latter will all be eliminated, while the former is still above 0.20 per cent., when making steel below 0.10 carbon. If high-carbon steel is wanted, it is better to put it into the steel after tapping, by means of the Darby process.

In practice it is found necessary to charge at least 50 per cent. of pig iron into the furnace when the bath contains more than 0.3 per cent. of phosphorus. When the bath contains 0.5 per cent. of phosphorus at least 70 per cent. of pig must be charged. In the first case the bath would contain 0.3 per cent. phosphorus and from 1.63 to 1.75 per cent. of carbon; and in the second case it would contain 0.5 per cent. of phosphorus and from 2.28 to 2.45 per cent. carbon. That is, the phosphorus is about one-fifth of the carbon.

The silicon should not be over half a per cent. in the bath, and ought to be as low as possible. The higher the content of phosphorus the less difference there need be between it and the phosphorus. If the pig and ore process be used, then the pig can contain as much as 2.00 per cent. of phosphorus, but in that case it is often necessary to "pig back."

It is an essential condition to the success of the basic open-hearth process that the slag should be highly oxidizing during the early part of the boiling period and as nearly free from oxide as possible at the end of it. The slag should be intensely basic from the start. Now, it is well known a large part of the carbon is also oxidized during the so-called silicon period of the Bessemer "blow."

I have not been able to find many analyses published taken from varying periods of the blow, and among those I have found none have the carbon as low and the silicon as high as the average given of the Ensley pig—i. e., carbon 3.35, and silicon 2.75 to 3.00 per cent.

In every report of such investigation that I have seen the carbon is 1.50 per cent. or below when the silicon has been reduced to 0.5 per cent., and is down to 1.0 per cent. when the silicon is down to 0.3 per cent.

Although the published analyses of basic open hearth charges are not very many, those that I have been able to get together confirm our own and seem to show that it is necessary to have about five times the amount of carbon as phosphorus with the latter at 0.3 per cent. in the bath; and about three and a half times the amount of carbon as phosphorus when the latter is from 0.5 to 0.6 per cent.

Of course, the lower the content of phosphorus in the bath, the harder it is to remove it. In order to get it below 0.02 per cent. it is almost always necessary to "pig back" under any circumstances. The pig which it is proposed to use at Ensley has 0.6 per cent. of phosphorus. The bath would, therefore, require from 1.90 to 2.10 per cent. of carbon to insure good and economical work. This pig also contains 3.35 to 3.50 per cent. of carbon, and from 2.75 to 3.0 per cent. of silicon. When this silicon would be reduced to 5 per cent., by blowing, the carbon would certainly be below 1.4 per cent.

This amount of carbon is not enough to carry 0.6 per cent. of phosphorus. The carbon would have to be left at about 2.00 per cent., and in that case the silicon would be about 0.75 to 0.8 per cent.

While this amount of silicon is very objectionable, still it can be used without very serious results; the principal of these would be loss of time and increased cutting of the sides and bottom, together with an increase in the amount of slag. Under these circumstances it will be perceived that little or no scrap can be used in the furnace, unless the Bessemer blow be stopped early enough to allow the carbon and silicon to be diluted. If this can be done, it hardly seems necessary to Bessemerize at all.

In order to get the product estimated upon above, it will be necessary for each furnace to make six heats per 24 hours, or one heat every four hours. I do not believe this is possible where the bath contains 2.00 per cent. of carbon, 0.8 per cent. silicon and 0.6 per cent. phosphorus, even with fluid stock. I think it would take six hours at least to charge the heat, tap it and make the necessary repairs. This would give four heats to the 24 hours per furnace. I think this result is a possibility and even a probability, but the probability is not a very strong one.

It appears, therefore, that the product upon which the above costs are based is a possibility with six furnaces in operation. In order to insure six furnaces in operation continuously, at least one spare furnace should be built. The cost of this furnace, with its platforms, would be about \$12,000, which would have to be added to the cost of the open-hearth plant.

The above argument is based on the great body of information which I have gotten together and upon my own experience. I am bound to say, however, that I have found two instances in which much quicker work has been reported. The first is given in Herr Thielen's remarks on J. W. Wailes' paper, "Notes on the Basic Open-hearth Process" ("Journal of the Iron and Steel Institute," 1887, No. II, page 132). Speaking of the practice at the Phoenix Works at Ruhrort, Herr Thielen says: "They used 60 to 70 per cent. scrap, and had a grayish or white pig iron, containing from 2 to 2½ per cent. of phosphorus. Their charges were worked, of course, much more rapidly. With a basic Siemens furnace they turned out two and a half times the quantity than could be done if they employed pig iron, and so had to waste two-thirds of the time in purifying the pig."

The above means that from five and a half to six heats are made in 24 hours from a mixture containing about 1.25 per cent. carbon and 1.50 per cent. phosphorus. This work is done on cold stock from which a large portion of the phosphorus and a smaller proportion of carbon is eliminated during the melting. The fact remains, however, that the phosphorus content is greater than the carbon content, and good work is done. How it is done I do not know, and it is not explained by Herr Thielen. We have not yet been able to do anything like it.

The second instance I have found in an abstract in the "Journal of the Iron and Steel Institute," 1890, No. II, pages 781-782, of an article by Prof. F. Kupelwieser, in the "Oesterreichische Zeitschrift für Bergund Hüttenwesen," Volume XXXVIII, page 261. In this paper Prof. Kupelwieser discusses the use of fluid pig iron in the open-hearth furnace. He decides that it is of advantage when the scrap added is much less than the pig iron charged, and also when the pig iron used is especially pure. He thinks that the difficulty which occurs of raising to a high temperature in a short time the fluid metal charged can be overcome.

He cites Witkowitz as an example, where three open-hearth furnaces have been running continuously on metal taken from the blast furnace. This metal has been subjected to blast for about two minutes,

the result of which is shown in the following analysis:

	Si.	Mn.	C.
Before the blow.	0.95	1.77	3.39
After the blow.	0.26	0.75	3.03

He then says: "The temperature of the metal when it reaches the open hearth is but slightly increased by this process. The charge consists of 90 per cent. pig iron, 10 per cent. scrap and the necessary quantity of ore, together with some lime to reduce the percentage of phosphorus. The process is very rapid, the three furnaces making about 17 charges in 24 hours. The fuel consumed is but from 10 to 12 per cent. of the weight of ingots made."

Unfortunately, it is not stated where the "blowing" is done, or how much phosphorus is in the pig, or whether the vessel in which the blowing is done is acid or basic in its lining. From examination of the quotation it seems to me evident that the blowing is done in a basic-lined vessel, and then charged into the furnace. This seems to be shown by the rapidity with which the silicon has been eliminated, leaving the carbon practically untouched, and by his speaking of the metal arriving at the furnace after having been "blown." It also seems to me that the phosphorus content of the pig iron must be low, from the very casual reference made to the lime additions.

One form of duplex process was in use at Witkowitz in 1888, in which two vessels were used instead of an acid vessel and basic open-hearth furnace. The process was rather slow, and very apt to make large amounts of scrap. I am informed that it has since then been abandoned. A study of Professor Kupelwieser's original article would probably give a much clearer understanding of what has been done with the "vessel-furnace duplex process," but I have as yet had no opportunity of so doing.

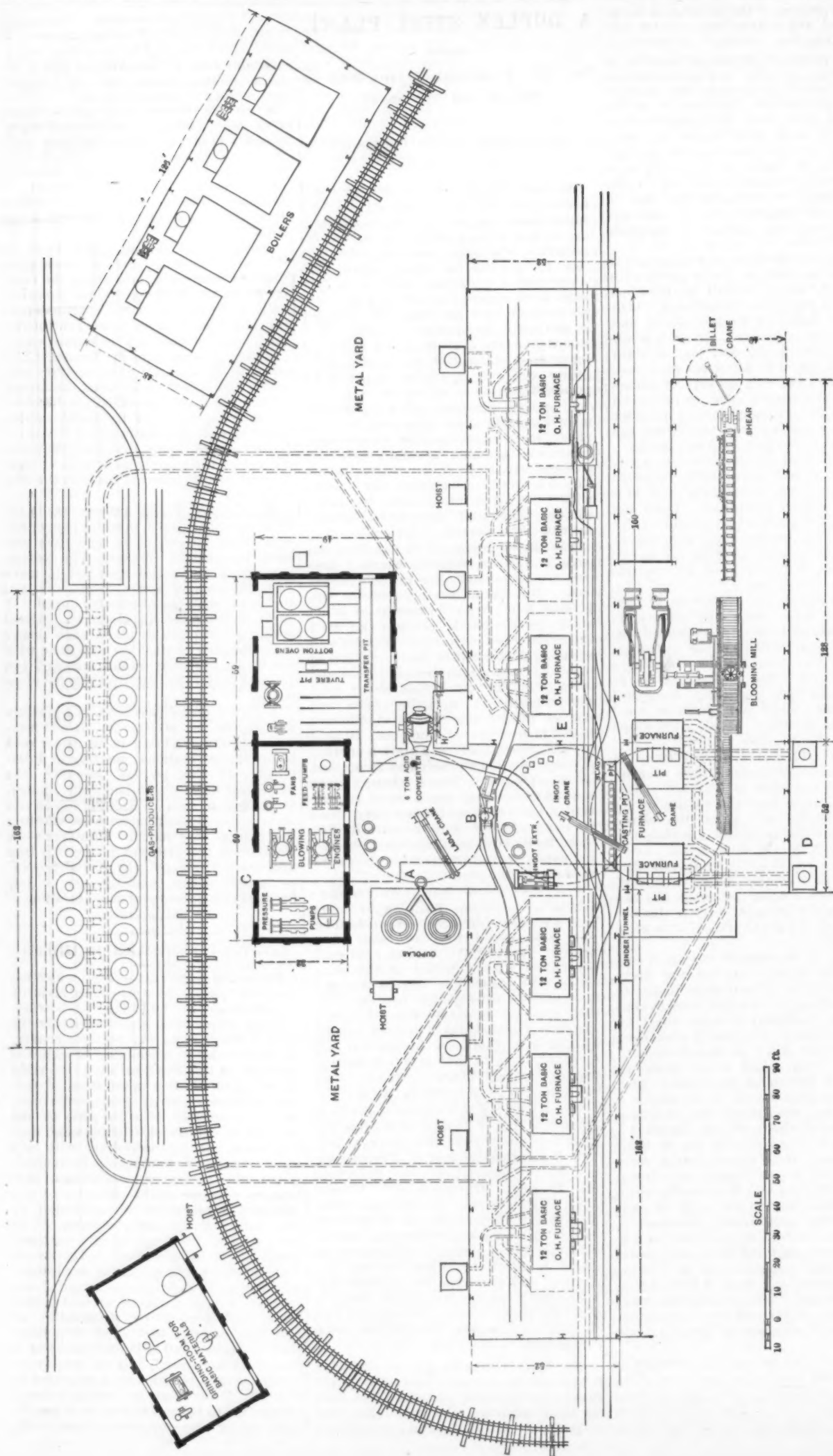
A duplex process has been, and possibly still is, in use at Hoerde. It was mentioned by Dr. Wedding in his paper read before the international meeting in Pittsburgh. In this process, however, the vessel and furnace both had basic linings. Of course in such a vessel the silicon can be very quickly reduced without affecting the carbon very much. Whatever work was done in this direction by the Otis Iron and Steel Company was of a purely experimental nature, and has not, as yet, been continued into practical operation.

(To be continued.)

Anti-Trust Legislation in Illinois.

Following is the text of a bill which has just been passed by a very large majority in both houses of the Illinois Legislature:

If any corporation, organized under the laws of this or any other State or county, for transacting or conducting any kind of business, in this State, or any partnership or individual or other association of persons, whosoever, shall create, enter into, become a member of or a party to any pool, trust, agreement, combination, confederation, or understanding, with any other corporation, partnership, individual, or any other person, or association of persons, to regulate or fix the price of any article of merchandise or commodity, or shall enter into, become a member of, or party to, any pool, agreement, contract, combination, or confederation to fix or limit the amount or quality of any article, commodity, or merchandise to be manufactured, mined, produced or sold in this State, such corporation, partnership, or individual or other association of persons shall be deemed and adjudged guilty of a conspiracy to defraud, and be subject to indictment and punishment as provided in this act. It shall not be lawful for any corporation to issue or to own trust certificates, or for any corporation, agent, offi-



The Duplex System.—Fig. 1.—General Arrangement of Plant.

cer, or employees, or the directors or stockholders of any corporation, to enter into any combination, contract or agreement with any person or persons, corporation or corporations, or with any stockholder or director thereof, the purpose and effect of which combination, contract or agreement shall be to place the management or control of such combination or combinations, or the manufactured product thereof, in the hands of any trustee or trustees with the intent to limit or fix the price or lessen the production and sale of any article of commerce, use or consumption, or to prevent, restrict or diminish the manufacture or output of any such article. If a corporation or company, firm or association shall be found guilty of a violation of this act, it shall be punished by a fine in any sum not less than \$500 nor more than \$2000 for the first offense, and for the second offense not less than \$2000 nor more than \$5000, and for the third offense not less than \$5000 nor more than \$10,000; and for every subsequent offense and conviction thereof shall be liable to a fine of \$15,000, provided that in all cases under this act either party shall have the right of trial by jury. Any president, manager, director or other officer or agent or receiver of any corporation, company, firm or association, or any member of any company, firm or association, or any individual found guilty of a violation of the first section of this act, may be punished by a fine of not less than \$200 nor to exceed \$1000, or be punished by confinement in the county jail not to exceed one year, or both, in the discretion of the court before which such conviction may be had. Any contract or agreement in violation of any provision of the preceding sections of this act shall be absolutely void. Any purchaser of any article or commodity from any individual, company or corporation transacting business contrary to any provision of the preceding sections of this act shall not be liable for the price or payment of such article or commodity, and may plead this act as a defense to any suit for such price or payment. The fines hereinbefore provided for may be recovered in an action of debt in the name of the people of the State of Illinois. If upon the trial of any cause instituted under this act to recover the penalties as provided for in Section 3, the jury shall find for the people, and that the defendant has been before convicted of a violation of the provisions of this act, they shall return such finding with their verdict, stating the number of times they find the defendant so convicted, and shall assess and return with their verdict the amount of the fine to be imposed upon the defendant in accordance with said Section 3; provided, that in all cases under the provisions of this act, a preponderance of evidence in favor of the people shall be sufficient to authorize a verdict and judgment for the people. It shall be the duty of the prosecuting attorneys in their respective jurisdictions, and the Attorney General, to enforce the foregoing provisions of this act, and any prosecuting attorney of any county securing a conviction under the provisions of this act shall be entitled to such fee or salary as by law he is allowed for such prosecution. When there is a conviction under this act, the informer shall be entitled to one-fifth of the fines recovered, which shall be paid him when the same is collected. All fines recovered under the provisions of this act shall be paid into the county treasury of the county in which the suit is tried, by the person collecting the same in the manner now provided by law, to be used for county purposes.

The revenue cutters *Rush*, at San Francisco, and *Bear*, at Seattle, have been ordered to proceed on their annual cruise to the Behring Sea.

A DUPLEX STEEL PLANT.

For the Treatment of Iron High in Silicon and Phosphorus.

BY GRAM CURTIS, CONSULTING ENGINEER,
PITTSBURGH, PA.

The vast deposits of rich ore in close proximity to beds of coal has already attracted large capital and developed industries that place Alabama in the front rank of our iron producing States. Cheap labor in addition to these advantages makes her a formidable rival in many branches for consumption of pig iron, and were it not for the fact that her product contains certain impurities that, at present, absolutely exclude it from a very large field of demand—that of the steel manufacturer—there is but little doubt that she would soon be crowding out many of our Northern furnaces, and not a few of the steel manufacturers themselves.

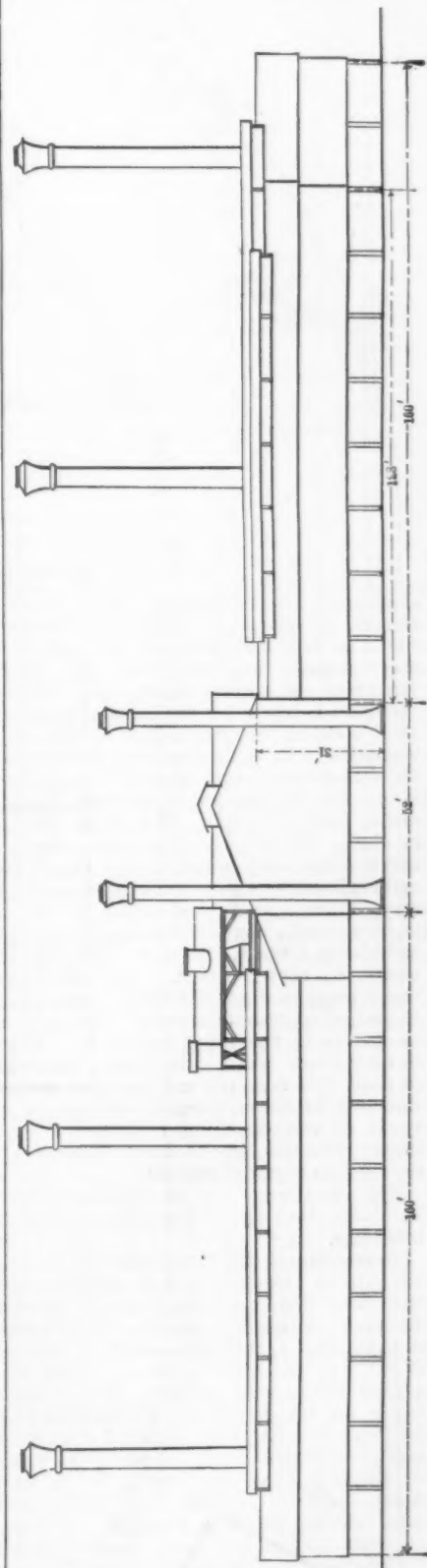
The large percentage of phosphorus, silicon and sulphur generally carried by these Southern irons renders them unfit for the manufacture of steel by any one of the more common methods. The high phosphorus, while rendering the metal unfit for the acid Bessemer process or the acid open hearth, is still not sufficient for the basic Bessemer, yet favorable for the basic open hearth. But in all basic treatments the high silicon is very objectionable, and if the attempt be made to exclude this element at the blast furnace, high sulphur, that enemy of the rolling-mill man, is the result. The basic open hearth, therefore, seems a promising and indeed, at present, a most important factor in the economical treatment of the Southern irons, but before this process can be employed satisfactorily the silicon must be greatly reduced, and this without materially increasing the sulphur. This requirement—reduction of the silicon—points directly to the acid Bessemer, for it is well known that the greater part of the silicon contained in the bath is readily eliminated by this method.

In other words, this metal calls for a double treatment, or for the duplex process, as it is called, in which process the pig—high in silicon and phosphorus—after being melted in a cupola is charged into an acid-lined Bessemer converter and then blown for several minutes, whereby practically all of the silicon is eliminated, together with as much of the carbon as may be desired, accompanied by a considerable rise in the temperature of the bath. It is then charged into a basic open-hearth furnace, where the phosphorus is got rid of and the carbon is further reduced to the percentage desired. This process is said to be now in successful operation at one works in Europe, Hoerde, where it has been necessary to treat a metal similar to the one in question.

The accompanying plans illustrate a plant specially adapted to this process, where the objects aimed at are economical and rapid handling of all materials, ample room and convenience for all operations of the process, together with strength and simplicity of detail. The buildings, Fig. 1, are located on each side of the elevated track for the supply of coal, refractories and raw materials in such positions that these essentials may be delivered at the desired points with the least amount of handling. Although shown single, room is provided for doubling this track when desired. With the exception of engine and bottom houses and the shop for grinding the basic refractories, all of which are of brick, the structures are entirely of iron. The main or central building contains the three cranes, the casting

pit and the two pit furnaces. The engine house, with its bottom house extension, is at the upper end, and in the several wings extending from either side are placed respectively the cupolas, the open-hearth furnaces and the blooming mill.

It will be observed that ample metal yards easily reached by the elevated track lie each side of the central building, con-



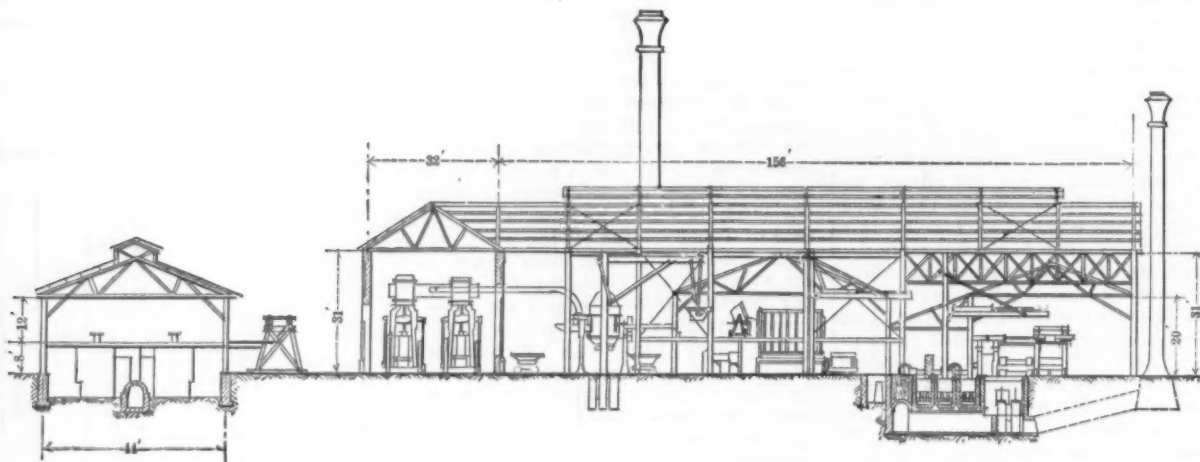
The Duplex System.—Fig. 3.—Elevation of Plant.

veniently located for the hoists which they serve. The melted metal from the cupolas is received by the ladle standing upon the scale at A, and is poured directly into the converter by the ladle crane. The empty ladle is then returned to the scale, and the crane takes another ladle of similar shape, into which it receives the charge from the converter after being blown. This it delivers to the charging car standing upon

the elevated track at B. The car and ladle are then run in front of the furnace to be charged by a small locomotive, and the pouring or charging into the furnace is effected by a worm and wheel which will be more particularly referred to below. The section on C D, Fig. 2, represents the ladle crane with a ladle in position for placing the latter upon the charging car, while the car with the ladle upon it is shown in front of one of the furnaces, in the act of charging. Upon the tapping side of the furnace the

perature of the bath, however, would be principally controlled by steam introduced with the blast; by this means the scrapping of the converter would be largely, if not entirely, dispensed with. The worn bottom on leaving the converter is received upon a car which is run on to a transfer car traveling in the transfer pit, and is carried laterally to the track covering the tuyere pit. Here the old tuyeres are knocked out, together with the worn lining, and new tuyeres are inserted. As the

a pit, a ladle crane, and one or more ingot cranes for each pair of furnaces, and in combination with the arrangement of tracks shown, it justifies a light, low and narrow building, or, in other words, it permits of a very economical structure for covering the furnaces. The capacity of the central casting pit with its attendant cranes is ample for the six open-hearth furnaces shown, and indeed for two or possibly three more, unless the partial decarburization of the charge in the converter



The Duplex System.—Fig. 2.—Section on C. D., Fig. 1.

casting car with its ladle is in position to receive its charge. A small locomotive (see Fig. 1) handles this car also and its accompanying slag car, conveying the former to the central casting pit, while the latter is left under the furnace runner. During the casting the motion of the car is controlled by the locomotive, and upon the completion of that operation the ladle is run over the slag pit, at the right hand end of the casting pit. Here it is taken in charge by the central or ingot crane, and is turned over for dropping the slag and replaced by a new ladle when necessary. There is an Argand burner for heating ladles at E, opposite the end of the first right-hand furnace, also at the ladle stand under the central crane. The central or ingot crane sets the molds in the casting pit, strips the ingots and carries any "stickers" to and from the ingot extractor. The furnace crane places the ingots into the furnace, lifts them out and lays them upon the table of rollers, whence they are conveyed to the blooming mill, and, after proper reduction, to the shear, where they are cut into required lengths.

Fig. 3 shows the elevation of the buildings, looking in direction of main buildings.

In addition to this brief description of the general arrangement and operation of the plant, there are a few points of detail to which attention is drawn. It will be noticed, Fig. 1, that the converter, which is eccentric and blows against a shield, is placed in the yard without effort being made for its protection. As the attempt to house this important detail of a Bessemer plant under a roof, except by the use of the very dangerous stack, has in so many instances resulted in its sooner or later cutting its way through, it was thought best to anticipate the inevitable by placing it out of doors at once. It is, therefore, located entirely outside the building, but in such a position that its nose when turned down is perfectly accessible to the ladle crane. The iron treated being high in silicon, the nose of the converter is made unusually large for the double purpose of decreasing the temperature of the bath and reducing the slop or the amount of melted metal and slag thrown from the nose during the blow. The tem-

perature of the bath, however, would be principally controlled by steam introduced with the blast; by this means the scrapping of the converter would be largely, if not entirely, dispensed with. The worn bottom on leaving the converter is received upon a car which is run on to a transfer car traveling in the transfer pit, and is carried laterally to the track covering the tuyere pit. Here the old tuyeres are knocked out, together with the worn lining, and new tuyeres are inserted. As the

very unexpectedly decreases the time required for the treatment in the open hearth. The general design is intended to admit of at least one additional furnace at each end of the present row.

In front of the furnaces a straight track 6 feet 2 inches gauge extends the length of the entire row, with a siding or turnout

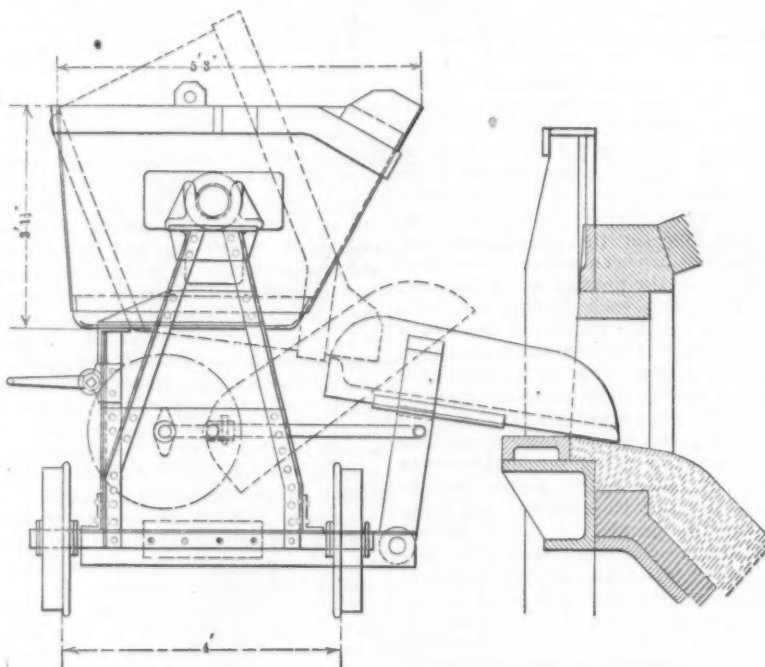


Fig. 4.—Casting Into O. H. Furnace.

11 inches it ceases to be held a very serious objection.

The three cranes, in addition to their lift, also rack in and out and revolve by power. Thus all their motions are positive and are made with promptness and precision.

The central casting pit is recognized as a marked economical feature of general design. As here arranged it is of easy access from all furnaces, it dispenses with

that covers the casting pit, and upon this track and siding runs the car carrying the casting ladle. Within this straight track are laid two narrow-gauge tracks for the locomotive and slag car. A third parallel narrow-gauge track is also laid so as to permit the locomotive to pass the casting ladle when standing under any of the furnace spouts. All the narrow-gauge tracks are connected at various points by switches, and for convenience in case of

emergencies or repairs a narrow-gauge track is extended to the converter.

For reaching the chambers beneath the furnace pits a cinder tunnel having a very

performing the very arduous task of keeping these chambers free from cinder. On the charging side of the open-hearth furnaces is the elevated track, previously

gives the additional advantage of available floor space throughout the entire swing of the ingot crane.

The car and ladle running upon this track are shown somewhat in detail on a larger scale, Figs. 4 and 5. The rather peculiar form of charging ladle, with the marked slope that shapes the lip extending to its very base, was adopted in order to decrease the angle of revolution necessary for its emptying, and the trunnions are likewise placed near the center of gravity, so as to render the power required for this operation as small as practicable. These trunnions, as will be seen, are made with double journals, the outer ones to be carried, as shown, by the bearings on the car, while the inner are to be received by the hooks of the crane harness. The left-hand trunnion is fitted with a pod end extension to receive the coupling box of the rotating bar. The ladle band is continuous, and is depressed in front so as to allow of a very convenient form of removable lip. The charging car is built chiefly of heavy angle irons and plates, and carries upon it the runner for entering the furnace door. This runner, which is the perishable portion of the apparatus, is so constructed that it can be very readily replaced. It consists of a wrought-iron plate bent to the form shown and adapted to receive the refractory lining. It is further fitted with wrought-iron braces, by which it is secured to the vertical carrying arm. The arm, in turn, is carried upon the frame of the car in such a manner as to permit it to vibrate through an arc of several degrees, sufficient to withdraw the runner from the furnace door and bring it so far within the frame of the car as to insure its clearing all extraneous objects when the car is in motion. A hand crank, geared to a swinging crank shaft with connecting rods, as clearly shown, controls this operation.

As the ladle is subjected to considerable handling, it was obviously desirable to have its attachments as few and simple as possible. This consideration led to abandoning the usual arrangement for pouring and to the placing of the worm and wheel for performing this operation, Fig. 6, upon the locomotive. Here this apparatus is fitted with a heavy worm-wheel shaft which projects forward and carries the coupling box that engages the pod end of ladle trunnion referred to above. The worm and worm wheel are placed within a dust-tight cast-iron casing and run in a bath of oil.

The casting ladle and car, also shown on a large scale, Fig. 7, are perhaps clearly enough illustrated to call for little or no explanation. The usual form of teeming breast and stopper are indicated. Security from overturning is sought by large trunnions placed above the center of gravity, and the insertion of a large iron pin into a vertical hole through trunnion and trunnion bearing.

A careful detailed estimate based upon current Pittsburgh prices places the cost of plant, built complete at the outset, as follows:

Bessemer machinery and fittings.....	\$81,195
Open-hearth furnaces, producers, flues, tracks, &c.....	116,925
Blooming mill, furnaces, producers, &c.....	97,068
Buildings for the entire plant.....	83,084
Foundations and excavations for the entire plant.....	30,270
Engineering and superintendence.....	16,000

Total..... \$424,542

If the locality rendered it feasible, molten metal direct from the blast furnace would, of course, be used. The provisions for receiving it could at any time be made without remodeling the buildings, and at a very inconsiderable expense. They consist merely of laying a track for the blast-furnace ladle between the cupola and engine houses, placing a scale like that at A, Fig. 1, so that the ladle standing

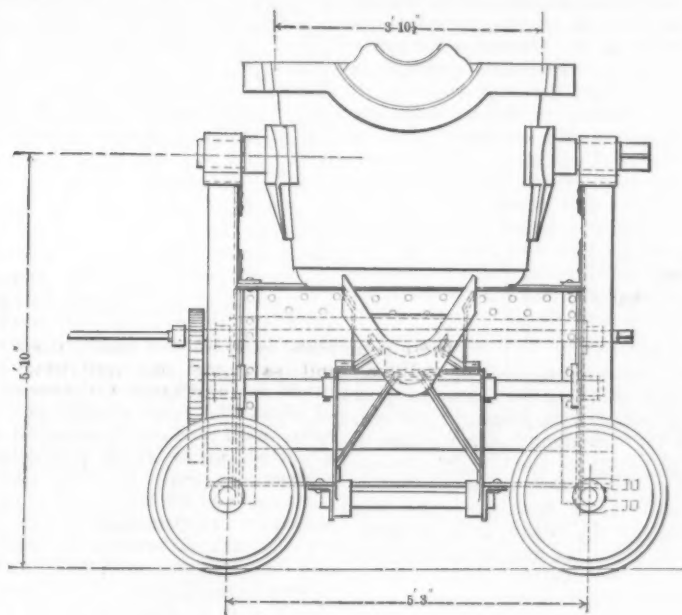


Fig. 5.—Ladle and Car for Charging O. H. Furnace.

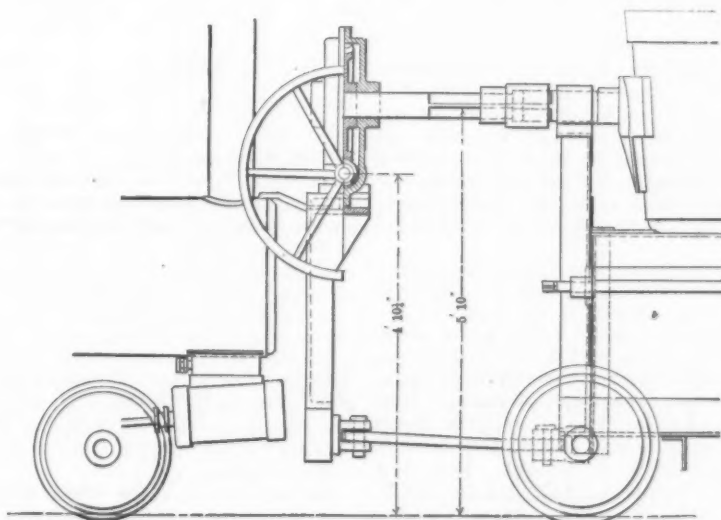


Fig. 6.—Arrangement for Charging Ladle.

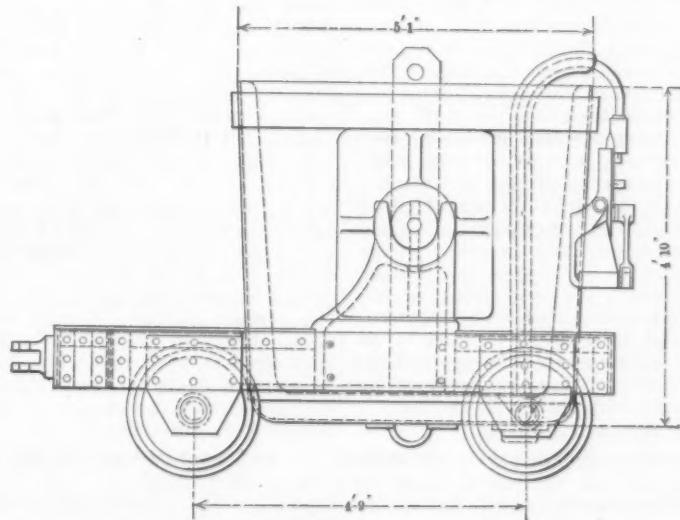


Fig. 7.—Steel Casting Ladle and Car.

moderate slope from the bottom of the furnace to the general level is constructed immediately back of the pit furnaces, furnishing a ready and convenient means for

mentioned, which runs the entire length of the row. At the middle the track is curved toward the ladle crane, so that its center shall lie within that orbit. This

thereon may be filled by the furnace ladle and then conveniently reached by the ladle crane, and the fitting of an overhead hydraulic cylinder for pouring the furnace ladle—as pouring under these circumstances is undoubtedly preferable to tapping. The blast furnace in such a case should be tapped at short intervals, so as to deliver its metal by small installments, say 24, 36 or 48 tons at a time. With one 6-ton converter supplied with proper blast a trained crew can handle 24 to 30 tons per hour, especially when the blow is not prolonged much beyond the silicon period; so, allowing for changing bottoms, blanking tuyeres, &c., this single converter, barring accidents, can easily handle the product of three, or possibly more, good-sized blast furnaces, and, as already intimated, is ample for the supply of the six 12-ton open-hearth furnaces, with an average of four heats each per 24 hours.

Works similar in character to the one discussed frequently start with the building and running of but a part—sometimes quite a small part—of the complete design, though this, of course, is not in the line of economical construction and operation; for the cost of establishing the partial plant, as we shall presently see, is by no means reduced in proportion to the diminished output, and the additions, from time to time, as the works approach full development, are almost invariably more expensive than the same amount of work built at the start; also the cost of production per ton is obviously increased.

The following estimate covers a converter, one blowing engine, one cupola, three open-hearth furnaces, one pit furnace and the blooming train, with all the requisite producers, boilers, pumps, &c., and buildings—about as small an aggregate of integral parts of the complete design as it perhaps would be advisable to start with.

Bessemer machinery and fittings.....	\$57,445
Open-hearth furnaces, producers, flues, tracks, &c.....	79,925
Blooming mill, furnaces and producers.....	79,068
Buildings requisite.....	60,293
Foundations and excavations requisite.....	23,433
Engineering and superintendence.....	12,000

Total.....\$312,164

With this initial plant the product is but one-half, while the cost of construction is three-quarters, that of the complete works. These estimates do not include freight, water supply or grading, but they do cover best material and workmanship, and are ample to do justice to the contractor while rigidly insisting at all times upon the integrity of his work.

Without further dwelling upon costs and details, it is thought that the items already mentioned, together with the above description of plant and operation, are sufficient to make clear the drawings as well as the general character of the design. The great benefits to be derived through the economical conversion into steel of these Alabama irons is a high incentive for the exercise of all the ingenuity and experience of the engineer, and the certainty with which this desideratum may be obtained by the simple combinations of methods and machines, which even the most conservative would not think of classing as experimental, should furnish a standpoint from which the capitalist could see his way to a safe and desirable investment.

It is claimed that the fastest craft afloat is the new German dispatch boat Meteor. She is 260 feet long, 31 feet wide, has a draft of 13 feet, and 950 tons displacement. Her engines develop 5000 horsepower, and at full speed she goes 24 knots an hour.

Another revolution is announced in Hayti, and financial troubles in Buenos Ayres cause fresh anxieties.

The Needs of the American Consumer of Tin Plates.

Before the recent meeting of the Tinned Plate Manufacturers of the United States at Pittsburgh, A. O. Kittredge, editor of *The Metal Worker*, presented a paper, from which we take the following:

If there is reason to depart from the Welsh plan of making tin plates, with its accompaniment of woman and child labor, for the purpose of adapting the industry to American ideas and conditions, then it seems to me there is equal reason for departing from the illogical, absurd and arbitrary nomenclature and trade conditions with which the Welshmen have surrounded the product of their works.

ABSURDITIES OF THE SYSTEM.

The Welshman marks a box of tin plates IC—this sign standing for something in the way of gauge or thickness. "C" was shorthand for "common" at some time in the ancient history of the tin-plate industry. The student of the tin-plate industry will further find that the "I" was prefixed to the "C," when another emergency arose, requiring another addition to the stock of designating terms. I am aware that there are other theories concerning the origin and first significance of this term IC, and that the one I have here accepted is in certain quarters seriously disputed. The mere fact, however, that it is attacked, showing that the origin of IC is in doubt, makes my point quite as well as the history I have tried to trace—which is that IC never had a definite meaning in the sense in which we use the word definite at the present day. It never designated a plate of a certain specific thickness, however expressed, nor of a given weight. It has always meant something "about" so thick or "about" so heavy.

When we come down to modern times, to the very present, we find IC indefinite in meaning. There is no standard by which to measure IC. The buyer of tin plates finds in the market IC plates weighing anywhere from 112 pounds to the box, which is now recognized in various directions as what ought to be standard, down to 90 pounds, which is acknowledged by everybody to be very light. The same arguments apply to IX, DC, DX, IXX, IXXX, and other marks familiar to the trade for their lack of definite significance.

In designations of coating and finish the tin-plate trade is also lacking in terms that are expressive and definite. As long ago as when real charcoal plates were in the market, and brought the higher price, they were more carefully finished as well as better coated than coke plates. So now, when all plates are steel plates, we have no better term to indicate a fairly coated sheet than the echo of the past, and so we apply the phrase "Charcoal Finish." Again, to indicate a plate that has a meager coating we use the other phrase, also an echo of a bygone era, and say "Coke Finish." Could anything be more absurd than this? Notice that the terms charcoal and coke are here used to describe the character of coating, and not with the least reference to the properties of the plate which carries the coating.

SHEETS TO THE BOX.

Tin plates are packed 112 or 225 sheets to the box, and are sold at so much per box. The question is, what is the cost per sheet or per square foot? There are comparatively few tinnermen, leaving out the managers of large manufactories, I take it, that are able to make the required calculations readily and with entire credit to themselves. But why should we have 112 sheets or 225 sheets to the box? No one knows, and yet under the Welsh régime there has been no help for it.

The present tin-plate classification, if classification it can be called, is likewise as inadequate as it is absurd. Before modern steel processes superseded the iron that was then used in tin plates we had charcoal plates and coke plates. Notwithstanding all the changes that the past 10 or 15 years have witnessed, we still have these terms current in the tin-plate trade. There is also this additional refinement of absurdity that in the cards of coke plates we have presented two columns of brands, one made from Siemens-Martin steel, and the other from Bessemer steel. But as there were formerly charcoal plates and charcoal plates, and coke plates and coke plates, so at present there are various sub-grades in each of these grand divisions. But there is no scale by which to measure their qualities, and so some one individual brand is singled out, and around it others of about the same quality are made to rally, with various disputes, it must be admitted, as to which particular family a given plate really belongs. No two experts agree in all particulars as to this last assortment or classification. In the charcoals, we have in bright plates Melyn grade and Calland grade and Grange grade and Alloway grade, and in the ternes we have Melyn and Worcester and P. T. L. and Dean and Abercarne grades. In the former set is the special absurdity that something else than Melyn stands at the head of the list of brands of plates of Melyn grade, and in the latter, by some of the cards, at least, that there is no Melyn at all in the so-called Melyn ternes. Similar discrepancies appear in the cokes.

THE NEEDS OF THE TINNER.

Using the term broadly, tin plates divide themselves into two general classes—namely, bright plates and ternes or roofing plates—each of which has peculiarities of its own, as well as special applications in use. In only one particular do the plates of these two classes agree, and that is in the iron or steel, up to the point of coating. The requirements of both kinds demand an evenly rolled, tough, yet pliable material, but as modern steel-making processes give this with substantial regularity there is little need of stopping here to formulate a specification of the qualities it should possess.

In bright plates the tinner demands, first, such gauge or thickness of plate as may be most suitable for the work in hand. Second, he wants either a light or heavy coating on the plate, as his preferences may be, the coating to be evenly distributed and entirely free from wire edges, lumps and blotches, and, third, he demands such sizes of plate as will cut the patterns necessary for the article he is manufacturing with the least possible waste. To facilitate his calculations of cost he may ask for one of several things. He may ask to have the plates come to him priced per piece, or, what is the same thing, priced by the box of a definite number of sheets. In the latter case 100 sheets to the box as the ordinary unit would greatly simplify matters as compared with the present method. In the matter of nomenclature in general he will ask for such terms as will enable him to specify gauge and character and thickness of coating without the chance of misunderstanding or equivocation.

THE ROOFERS' REQUIREMENTS.

So much labor is consumed in making long strips for roofing that the thought at once suggests itself, why not give him long sheets at the start? Instead of compelling him to make a cross seam every 28 inches, in strips 20 inches wide (that is, using 28 x 20 plates), why not give him plates 20 x 56, or 20 x 96, or, better yet, 20 inches wide by 50 or 100 feet long, if such things are possible? In any event the roofer will be glad to get his material in as long lengths

as you can make it, and thereby diminish his labor of preparation. And right here let me say that what is good for the tin roofer is good also for the iron roofer. The latter is now using sheets 96 and 120 inches long. He would gladly avoid cross seams at even these considerable distances apart, and use long strips, say 20 feet and upward in length. So much for the roofer's labor as affected by the sizes of the plates he employs. Let us next question him about his calculations. He sells by the square foot. Manifestly, then, he wants to buy by the square foot, or in a way to enable him to readily translate the price per box or pound into a price per foot.

As to the plate in general, the roofer wants the coating even; that is, not more on one half of the sheet than on the other half, and free from wire edges and blotches. He also wants the plates "square"—that

4. Number of sheets to constitute a box, if the box is to remain the common unit.

5. Basis of pricing. Shall it be by the pound or by the box?

6. Various subordinate details, like brands, weights of plates marked on boxes, stamping the sheets of special qualities, &c., which belong to individual firms and companies to settle rather than to the industry at large.

The sizes of plates that you will make, I take it for granted, will be those which the consumer wants. The only point I have to make here is that in the past it has been exceedingly difficult for him to get anything except the so-called standards, and that, therefore, he has used the standards in many instances where something else would have suited him far better.

Wire-gauge designations of thickness of sheets or plates, it seems to me, cannot answer a satisfactory purpose in the new industry, for two reasons: First, because there is no standard wire gauge—that is, no wire gauge universally accepted. Second, it is impossible to apply a gauge, even of the micrometer variety, to a plate in a way to definitely prove anything. There is enough variation in the different parts of the same sheet, even though most carefully rolled, to induce endless dispute whenever any question arises.

DEFINING THE COATING.

How you will specify quantity of coating I shall not even attempt to guess. In the matter of coating there has been more deceit practiced in the past than in any other particular, and it needs the most careful attention at your hands. There has never been suggested an adequate plan of specification of coating, so far as my knowledge goes. "Pounds per box" has perhaps come the nearest to it, but unfortunately this plan had the serious defect of no one knowing exactly how much coating was being applied when the plates were making, and there were no convenient means of determining how much was carried after the plates were in the hands of the consumer.

If the box is to remain the common unit, I think the universal vote will be in favor of some such plan as 100 sheets to the box. Personally I like the plan, particularly for roofing plates, of having 100 square feet weigh a certain amount, and then packing the boxes as may be determined by other considerations. But the requirements of the manufacturer of tinware and of the roofer are not alike in this particular. You will doubtless recognize two methods, one for bright plates and one for ternes.

THE USE OF BRANDS.

Brands of tin plate, by which I mean the trade-marks, names or symbols, by which particular makes are distinguished, have been greatly abused in the past. Private brands, wildcat brands and makers' brands have all come under more or less suspicion at times. Plates have even been imported without brands, and then branded in the dealers' warehouse according to the price at which he had sold the plates. Under the system of guarantees, which is a comparatively new feature in the trade, a few brands have been built up so as to become very valuable properties. All this suggests the thought that you will do well to select your brands without unnecessary delay, duly register them as trade-marks, and then guard them most carefully. But after all, in the new order of things, brands can never be as important as formerly. The name of the works will be the first important thing the trade will remember, and then will come the general grade designations, by which the different qualities of material turned out by those works are known. The particular brand applied to the goods will be a comparatively insignificant matter.

These remarks would not be complete without some particulars about guarantees on tin plates, something already alluded to. It is a strange thing to say, but it is true, nevertheless, that the trade was in such a chaotic condition only a short time since that no importer dared to send out a lot of tin plates with a specific statement of their quality and to guarantee them to be as they were represented. It required a virtual revolution in the trade to make this most reasonable feature of business an actual possibility. Even now the practice is by no means universal, but, by their experience to date, consumers have learned to greatly like to buy plates upon this plan—namely, that the goods are guaranteed by the seller to be as represented.

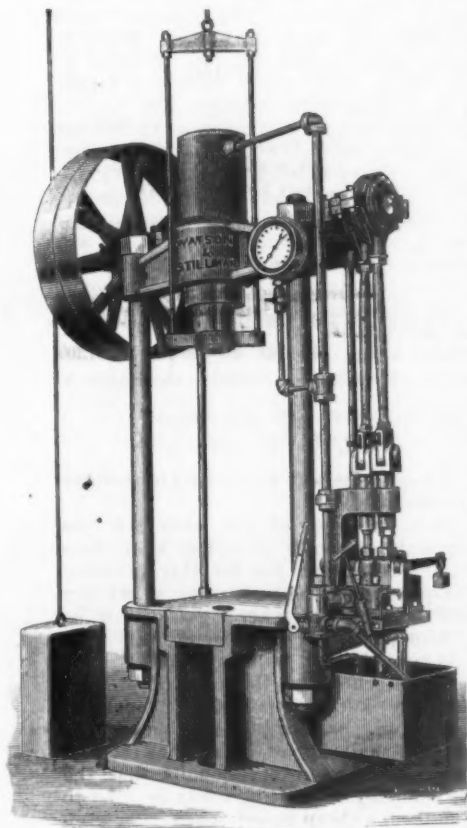
STAMPED SHEETS.

To protect the importer or seller who gives his guarantee that a given lot of plates are equal to representations against the danger of having inferior plates from another source charged up to his account, and, further, to insure the use in given jobs of roofing, for example, of the exact plate that has been specified, the plan of stamping the individual sheets came into vogue. At present all the better roofing plates are stamped, and while there are occasional abuses of this method—for example, where an importer for a consideration allows his brand, for which an excellent reputation has been secured, to be applied to inferior sheets—the advantages are so great that I do not think you can well avoid following the example which leading importers have thus afforded you. The plan of stamping sheets was brought into use to thwart the practices of dishonest men, importers, tanners, contractors and others.

Hydraulic Broaching Press.

The press we here illustrate is similar in design to the plain 60-ton press built by Watson & Stillman of New York. It is provided with a plain delivery belt pump, and the shaft and eccentrics are placed at the top of the press and one side of the cylinder. The pumps are upon the shelf at the side of the lower platen. The main tension rods are $3\frac{7}{8}$ inches in diameter, placed in line with the center of the ram. In the bed a square block is inserted, which is bored to suit the size shaft on which the work is to be done, so that the resistance may come close to the shaft and not create any bending action upon the work, and cramping the shaft as it is forced into the hole. The opening in the bed beneath the block is carried through the base, so that in case it is desired to force long shafts out, it may be done, provided a hole is made in the floor underneath. A small handle, which is convenient, shuts off the action of the large pump, and a small lever, operating an improved form of release valve, releases the pressure from the ram and allows it to be drawn back. In case there is any great variety of work a special block is made, which can be easily attached to the ram proper, and this, when placed in the press, shortens the clear space available. As the strain of driving the pump lies outside of the main tension rods, small ones are placed outside of the bearings of the shaft. One-third of the base lies in front of the center line of the main bolts in the 100-ton size, instead of all back, as is shown in the 60-ton form, made by the same firm. A safety coupling protects the gauge from injury by the sudden releasing of the pressure. We might add that these machines are in use by some of our best tool builders.

The Manhattan stockholders have authorized the issue of \$4,000,000 of stock for the purpose of acquiring the property of the Suburban rapid transit.



Hydraulic Broaching Press.

is, accurately rectangular—so that they will seam together without the need of preliminary trimming in the squaring shears. He further requires some definite plan of designating the coating that the plate carries, so that he can buy what his architect's specifications call for and at the same time get what he buys and nothing else.

The consumer, both of bright and terne plates, has the right to know when buying a quantity of tin plate, either at so much per box or at so much a pound, what amount of iron or steel he is getting and how much coating. This, I think, will force upon you some plan of indicating the kind of coating and of specifying the quantity per box or per square foot, or per hundred square feet, whatever the unit may be.

POINTS TO BE CONSIDERED.

The principal points which you are called upon to consider in formulating your plans, are these:

1. Sizes of plates to be made.
2. Designation of gauge or thickness of plate.
3. Designation of kind and thickness of coating.

GAS ENGINES.*

BY E. M. JENKINS, COLUMBUS, GA.

For a number of years the writer has made a special effort to introduce, in the limited field of his operations, as many gas engines as possible, and the success attending his efforts has led to the conclusion that much could be done in this way to aid in the sale of gas in the day time, if a proper effort was made on the part of many to place the merits of these engines before their customers in a concise, practical manner.

When I say to you that we sell over 8 per cent. of our entire output for this purpose, you can see that it is a business that is well worth cultivating.

In the gas engines mentioned in this paper ordinary 17-candle power coal gas was used, and in comparing them with smaller steam powers, the price for gas is placed at \$1.25 per 1000 cubic feet, that being the rate for gas sold for this purpose in Columbus, Ga. I have estimated in the steam work the average price of steam coal at the same place.

The price of materials mentioned in this paper will, of course, vary in different localities, but, as a rule, where coal is cheaper gas can also be sold at a correspondingly lower rate.

Gas Motors Compared With Steam Engines—With Varying Loads.

In the following estimates I have taken, as nearly as I could, the average steam plant of the sizes named. I am fully aware that some steam plants of these sizes are run much more economically, but I also know of many others which do not begin to do so well.

In order to get a satisfactory result from a small steam plant, it is necessary to have the boiler somewhat larger than the engine.

Four H. P. Steam Engine, Seven H. P. Boiler—Ten Hours Per Day.

Coal, 500 pounds, at \$2.50 per ton.....	\$0.62½
Labor.....	.25
Oil, waste and repairs.....	.12½
Water, 350 gallons, at 15 cents per M.....	.05½
Extra insurance, one-half of 1 per cent. on \$4000.....	.06½
Total, per day.....	\$1.12
Per month, 26 days.....	\$29.12
Per H. P. per month.....	\$7.28

Gas Engine (No. 3), Four H. P., Ten Hours Per Day.

Monthly average per H. P. for gas, at \$1.25 per M.....	\$3.90
Oil and waste.....	.60—\$4.50
Saving per H. P. per month.....	\$2.78
Saving per year four H. P....	\$133.44

Seven H. P. Steam Engine, Ten H. P. Boiler—Ten Hours Per Day.

Coal, 700 pounds, at \$2.50 per ton.....	\$0.87½
Labor.....	.50
Oil, waste and repairs.....	.15
Water, 500 gallons, at 15 cents, per M.....	.07½
Extra insurance, one-half of 1 per cent. on \$5000.....	.08
Total, per day.....	\$1.68
Per month, 26 days.....	\$43.68
Per H. P. per month.....	\$6.24

Gas Engine (No. 1), Seven H. P.—Ten Hours Per Day.

Monthly average per H. P. for gas, at \$1.25 per M., \$3.25	
Oil and waste.....	.60—\$3.85
Gas Engine (No. 2), same as above.	
Monthly average per H. P. for gas.....	\$3.00
Oil and waste.....	.60—3.60
	\$7.45

*Read at the meeting of the Western Gas Association, Louisville, Ky.

Making average for the two engines.....	\$3.73
Saving per H. P. per month.....	\$2.71
Saving per year seven H. P.....	\$227.64

In the above estimates I have taken the actual result of each gas engine and computed on a ten-hour basis. Where power is intermittent, say only needed four or five hours one day, none the next, and then, perhaps, six or eight hours the following day, the saving would be greater than shown above. In either of the cases mentioned the saving would pay the additional first cost of the gas engine in about three years.

Gas Power as Compared With Electric Power.

When we come to compare the cost of gas power with electric motors we strike the same problem that we do in selling gas for lighting purposes in competition with the electric light, viz. that the electric companies, as a rule, do not consider the cost of producing the power they furnish, but simply make a price lower, if possible, than the existing gas rates. They manage to manipulate figures in a way peculiar to themselves, and in a great many cases not only convince the consumer that he is in the line of progress by adopting electricity as a motive power, but really prove to him that he is the gainer also. This is especially the case where electric companies are just starting out in this line of business, as they are extremely anxious to get sufficient income at the beginning to enable them to at least pay for the coal used.

The question naturally rises, should gas companies attempt to meet such prices by selling gas at—say cost in the holder? I think you will all agree with me in saying, No. We had better lose for a time a part of such business than to make the price so low that we would not feel justified in keeping it at such a figure for any length of time, but would expect to increase the price when electric companies found that they would have to charge more.

The public are always ready and willing that the price of gas should be put down—the lower the better for them—but are never willing to have a raise in price, be it ever so little. Still, from the best information I can get, I believe that gas power can be furnished at a more reasonable price than electric.

For small powers there is now made a one-third horse-power gas engine that has found a ready sale. The cost of running same is about 1 cent. per hour, 10 cents per day, or \$2.60 per month—or at the rate of \$7.80 per horse power per month. For similar powers the electric companies charge from \$8 to \$12 per month per horse-power. The average price for gas per horse-power per month in several cities is about \$3.50, while electric companies charge from \$4 to \$7 per horse-power per month for motors, according to size. The great advantage in price that gas power has is that the consumer pays for just what he actually needs and gets—if he only needs power 1 hour to-day and 14 hours to-morrow he pays in that proportion; with electric motors he pays for 10 hours' service every day.

Again, gas power is much more reliable and is ready every hour of the 24, while electric power is subject to frequent interruption from changes of line, or the various peculiarities the current has of getting lost between the central station and the consumer.

As compared with water motors, gas engines can be run for from one-half to one-fourth the usual charges for such service, especially where a water meter is in use—in such cases the charges for water

average from \$10 to \$15 per horse power per month.

With the figures as shown herein, demonstrating that gas power has many advantages over steam, water or electricity in most cases, the question naturally arises, why is so little done in the way of pushing this branch of the business?

There are two main obstacles to contend with: First, the cost of gas engines; second, the price charged for gas.

In regard to the first named, the prices charged for gas engines are entirely too much; in fact, out of all proportion. Gas-engine builders continually cry, "Put down the price of gas," but they never consider the advisability of reducing the price of the engines. A 4 horse-power steam engine and boiler complete can be purchased for, say, \$270, and a 4 horse-power gas engine alone costs \$620, or 130 per cent. more than the steam plant.

A 50 horse-power steam plant can be purchased and set up for \$1600, while two 20 horse-power and one 10 horse power gas engines would cost \$4100, or 156 per cent. more than the steam plant. Gas engines ought to be furnished for what a first-class steam engine of same power would cost. Compared with the cost of electric motors, they are as follows:

Horse-power.	¾	1	2	3	5	10	20
Gas engine	\$22	\$180	\$280	\$620	\$780	\$1,010	\$1,550
Electric motor....	90	160	425	600	700	1,100	

It will be seen that gas engines cost a great deal more than any other power named.

Cannot some way be devised to remedy this obstacle?

As to the price of gas, very few gas companies are now charging more than \$1.50 per 1000 for gas for this purpose, and quite a number are selling at \$1 per 1000. The cities where gas cannot be sold for \$1.25 for gas power are very rare.

In conclusion, I will say that a little persistent effort on the part of the gas manager, keeping posted as much as possible in regard to the probable requirements of the users of small powers and letting them know occasionally that the gas company is existing solely in order to give them a cheap power when they need it, such labor will surely bring good reward.

The copper house that N. Poulson, the iron manufacturer, built in South Brooklyn, near Fort Hamilton, is a marvel in that section of the country. It is all of metal, on a light framework of steel, the floors being supported by arches. The walls are composed entirely of large copper plates riveted together with double seams and bound with iron. The cornices, the trimmings, the posts, the railings and the sheathings are entirely of iron. The copper is not polished, but each plate is set in rough hammered. Each plate makes a panel with the iron bindings. In three of these panels brass medallions are set in *bas relief*. On the two tall brick chimneys are iron *bas-relief* work, one figure representing a phoenix. The style is Queen Anne, and time will color the whole structure in a rich antique of copperas hue.

The Rapid Transit Commissioners have finally made a report in which they advocate an underground four-track railway under Broadway from South Ferry to Fifty-ninth street and thence under the Boulevard to 169th street. They decided that the motive power shall be electricity or some other power not requiring combustion within the tunnel.

AMERICAN ARMOR

Trial of the First American Plate.

[With Supplementary Sheet of Engravings.]

At the last meeting of the Iron and Steel Institute, W. H. Jaques of the Bethlehem Iron Company, South Bethlehem, presented a paper on "Recent Progress in the Manufacture of War Material in the United States." We reproduce that part of it which deals with armor, and present also engravings of the first plate of heavy armor made in the United States by the Bethlehem Iron Company:

As this subject is one of such paramount interest at the present moment, and has been so earnestly and recently discussed, I venture a fuller reference than was at first my intention, hoping that further discussion will throw more light upon a much-vexed topic.

Mr. Biles has said that the making of armor was a question more for iron and steel manufacturers to discuss, the working of it into a finished design of a ship being the business of a naval architect, but I am sure that many steel makers will join me in the hope that Mr. Biles and his fellow naval constructors will in their future designs for ships and their protection, their motive power and their armament, simplify as much as possible the forms of the great masses of iron and steel that have become such a necessary part of naval construction.

In the Annapolis plate trials of September last the British compound system (Charles Cammell & Co., Sheffield) had a most excellent occasion for an exhibition of its qualities, their agents in the United States being enabled to present every favorable estimate of the British compound armor that they possessed. Their long experience as importers of foreign steel undoubtedly fitted them to lay before the Secretary all that was most favorable in the manufacture of their clients' particular type of ship protection.

The Annapolis trials, which cannot be too strongly commended for their comparative excellence, would have been much more complete if Messrs. Brown & Co. of Sheffield had been invited to send a plate for trial. I understand their representative in the United States did not suggest their entering the competition. This is to be regretted, for in many comparative trials of the plates of the two representative Sheffield makers the Brown plates have shown considerable superiority over the Cammell, while in the Ochta trials of November 11, 1890, the existence of through cracks in the Brown plate indicated a better weld than ordinary.

At Annapolis the victory for steel armor was so overwhelming that the small difference, if any, which existed in the ballistic resistance of the two steel plates only suggested to my mind the necessity for additional experiments with nickel and other alloys, and methods of treatment, with the view of combining, if possible, all the excellent characteristics that both plates displayed in the severe tests to which they were subjected. As both steel plates were eminently superior to the Cammell plate, another decisive victory for steel was secured in a competitive trial which was conducted with the strictest equality of conditions. It has been stated that the Cammell plate was not a fair average sample of the Wilson type; but whether the plates tried at the various trials were fair average representatives of their type or not, they ought to have been. At the last meeting of the naval architects Mr. Biles took most excellent ground in relation to this when he stated that manufacturers should not make a mistake which

would seem inexcusable for so important a result. In general it can be axiomatically stated that in a comparison of plates tested in competitive trials the arguments that are offered that haste in delivery, or deficiency in manufacture, have rendered them inferior to those of current make should not be allowed to enter. The manufacturers ought to guard their own interests by sending the very best plates they can make.

In congratulating W. H. White upon the successful accomplishment of his naval construction budget, and the remarkable results that have been obtained in ship-building since his accession to the Admiralty, I cannot but regret that he has not yet added to his record the history of the competitive trial, on British soil, of all the various types of armor plate that are now so seriously engaging the attention of naval constructors and ordnance engineers.

He has referred to a 4-inch nickel-steel plate, from a test of which, he says, very interesting data have been collected. If he could procure the publication of these results, together with a full unbiased report of the Nettle trials, he would undoubtedly be able to remove much of the prejudice that now exists with regard to them, and which can hardly be designated as an unjust prejudice so long as the public is kept ignorant of all the facts, except such as it may be to the interest of each individual manufacturer to publish. In relation to the 4 inch nickel-steel plate I would like to ask Mr. White with what caliber of gun, type of projectile, velocities, &c., this plate was tested.

Although reference has been made to experiment with nickel-steel armor plates in England, from all I can learn no nickel-steel plates of the thickness, dimensions, and mass of the one that was tested at Annapolis have ever been tried in England. The great value of the Spezzia trials of October and November, 1884, and the Annapolis trials of September, 1890, is their fairness, openness, and equality of tests, by which means only can strictly useful comparative results be obtained. The desire of governments to keep from their rivals the results of tests is only natural, but if any statement is made concerning them, the whole truth should be given, in order to enable artillerymen and metallurgists to make comparisons which will be of any scientific value.

With European governments, and with Great Britain especially, the pride of protecting their industries keeps up the fight for the defense of compound armor. With most manufacturers it is the pride which essentially accompanies the success of their systems, while with some royalty obligations are the principal incentive. The United States appears to be the only power where all this is ignored, in fact ignored to such an excess, accompanied by the desire to get something different and cheaper, and more quickly, that the manufacturers assume serious risk when they undertake the supply of material which is to extend over such a long period as to permit their orders to be affected by the political and personal interests which so frequently govern legislation.

If the Nettle trials of 1887-1889, and the Ochta trials of November 11, 1890, had been made under similar conditions to the Annapolis trials of September, 1890, much valuable data might have been added to that already on hand, to assist in defining the comparative resisting powers of modern armor plates, and securing the unanimous opinion of many authorities who are now at such variance regarding the results of these trials. The first have subjected officials and manufacturers to unfavorable criticism, perhaps unjustly, while the last have incited a competition and development of ideas and systems and treatment never before witnessed in the consideration of such matters.

These views are not by any means new, either to the writer of this paper or to his auditors or readers, for both of the British public service journals, the *Engineer* and *Engineering*, have repeatedly called attention to them, not only advocating, but urging, what seemed to them the proper consideration of this very serious subject. I have even personally urged your chief constructor, Mr. White, whose success and ability I had already recognized by recommending the adoption by the United States of the designs of a fast cruiser (the last he designed before his departure from Armstrong, Mitchell & Co.), to secure a competitive trial that would, at least for the present, give such definite data as would leave no doubt as to which system (all steel or British compound) provided the best defense against the probable attack of modern sea fighting. In this, however, the United States Navy Department has now anticipated him.

If you are not willing to acknowledge the superiority of all-steel armor over Sheffield compound, you must believe it to be equally good; hence one ship armored with French steel would not in any way weaken your navy. You can afford it, for you have more engineers interested in the results than any other nation; more manufacturers interested in the industry, and consequently more at stake, than any other nation. If Messrs. Schneider set up the temporary obstacle of requiring an order for the armor of one ship as a condition of success, why not grant such a condition? You would lose nothing by it, for, as Mr. Barnaby says, no doubt the Admiralty would have agreed to give the order if when the plate had been tried it had proved satisfactory.

You have given an order to Messrs. Vickers because the success of their all-steel plates warrant it, and I believe that you would do the same without hesitation to Messrs. Schneider. This would lead quickly to the production of similar plates in your own territory, particularly as Alexander Wilson has stated that his firm is one of the largest makers of steel armor, as well as compound; and your Sheffield compound armor plate makers would lose nothing, save perhaps a decrease in the royalties which one firm may yet have due under their contract with various makers.

Mr. Vickers has made a most interesting statement regarding the Nettle trials. He said: "With regard to the Nettle trials I do not agree with either Mr. Wilson or Mr. Ellis; if I could lay the full results of the trial before the meeting, I think it would be seen that our two plates were the best."

In 1886 I concluded a paper on the subject of "Modern Armor" * with these words: "In regard to future development I am not alone in the belief that the progress is limited to steel. Whether the best steel plate will be compounded mechanically—and there are those who believe they have devised the means—or whether the Schneider hard front and soft back will reach the highest development by the means he now employs, the future must decide."

There have already been produced compound steel plates that have shown far better results than have ever been obtained with British compound, while many other mechanical devices are being experimented with which promise excellent qualities. The future is rapidly compassing a decision, and the Annapolis trials of September, 1890, have, I believe, done more to expedite it than any other tests yet inaugurated. The method of their conduct gave them a prominence that could not have been obtained in any other way. Much was promised from Mr.

* "Modern Armor for National Defense." New York and London. G. F. Putnam's Sons.

White's endeavors of 1886 and 1887 to secure for competitive test a large number of plates from all the big steel makers of Great Britain, from whom he invited sample plates, including one from Creusot; but there resulted private trials of only a few of them under varying conditions, and thus far only such information has been made public by the various representatives interested as most naturally would commercially benefit them.

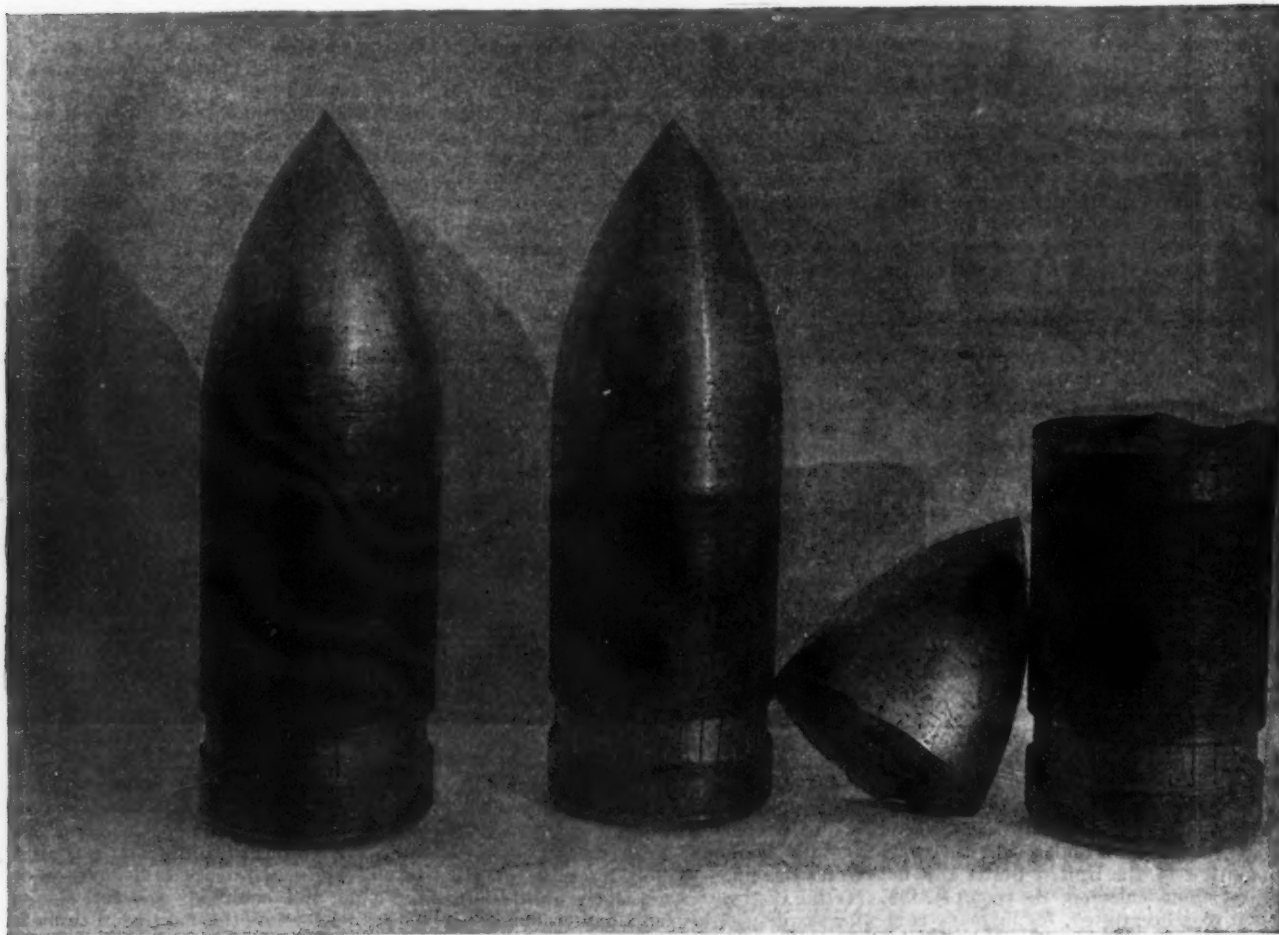
It is unfortunate that the Kolpino plate could not have been tested in the same public manner and under the same conditions as the other plates tried at Oehta on November 11, 1890, for the peculiar privacy attending this particular plate and the variety of opinions as to the nature

as follows: The compound has a face made of steel of a harder kind than can be got from the action of any special treatment on metal suitable for the back or foundation. This it obtains at the cost of a junction of the two metals." By cementation and subsequent working and treatment equal hardness can doubtless be obtained, but probably at the cost of brittleness and cracking. A harder face has been obtained by cementation and cold hardening of the solid steel plate than by the usual compound attachment. This was done in the case of the 10 $\frac{1}{2}$ -inch untreated Creusot steel plate subsequently treated by the Harvey process at the Washington Navy Yard, and tested at Annapolis with a variety of Holtzer and Car-

000 for the purchase of nickel matte. He states in his annual report for 1890 that "the vice of the all steel armor is its tendency to crack. This liability to crack at shock or perforation seems to be removed by an alloy of about 5 per cent. of nickel.

The mixture enhances to a noticeable degree the qualities of elastic limit and tensile strength, leaving the percentage of elongation at a figure which makes cracking almost impossible. These qualities are precisely those necessary in armor plate. The nickel plate, though slightly more penetrable, remained absolutely uncracked."

It is currently reported that the Department has made a conditional contract with



No. 1.

No. 2.

No. 3.

PROJECTILES USED IN ARMOR PLATE TRIALS.

and quality of the projectiles used naturally excludes it from comparison. In this connection I am glad to quote the opinion of the *Engineer*, so long a defender of Sheffield compound armor, that "We maintain that compound armor has suffered by the yielding of the soft mass of the foundation plate of wrought iron, and that steel has stood up better to the blow of the shot under most conditions. Consequently, the mass of the compound armor ought to be made of harder material. We believe that harder iron is now being employed. We are sorry to hear it, for steel must, in the long run, beat iron, and we regard the most hopeful plate to consist of a hard steel face, with a softer steel back or foundation. It may be asked, will this beat solid steel of the same quality throughout? This we think entirely depends on the power of the face plate to adhere to the foundation.

"The difference in principle between compound and all steel may be summed up

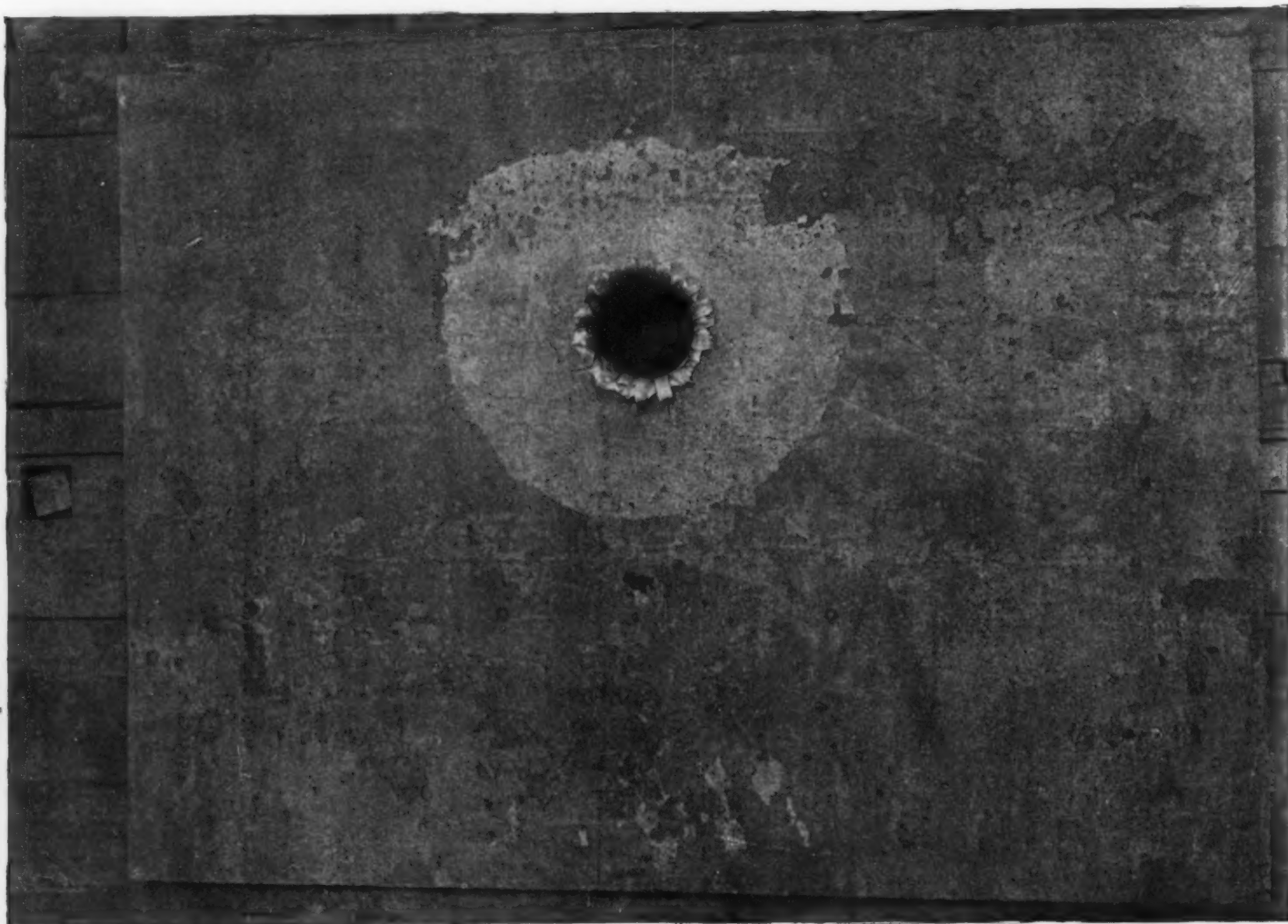
penetration armor-piercing shells. Mr. Kirchhoff, the able editor of *The Iron Age*, has given in that journal's issue of March 19, 1891, the best description of these tests yet made public. As you will no doubt be interested in them, I have inserted such details and drawings as will best describe the results obtained. . . .

After many years of study and trial and expenditure there are as many opinions as to what ballistic resistance means as there are manufacturers of plates and officers who have witnessed the tests, and yet there is not one definition that can be accepted as governing, regulating and defining ballistic resistance. This is manifest from the following variable acts and opinions, which are quoted only to emphasize the point I wish to make—namely, the absence of any concurrence of opinion regarding ballistic resistance.

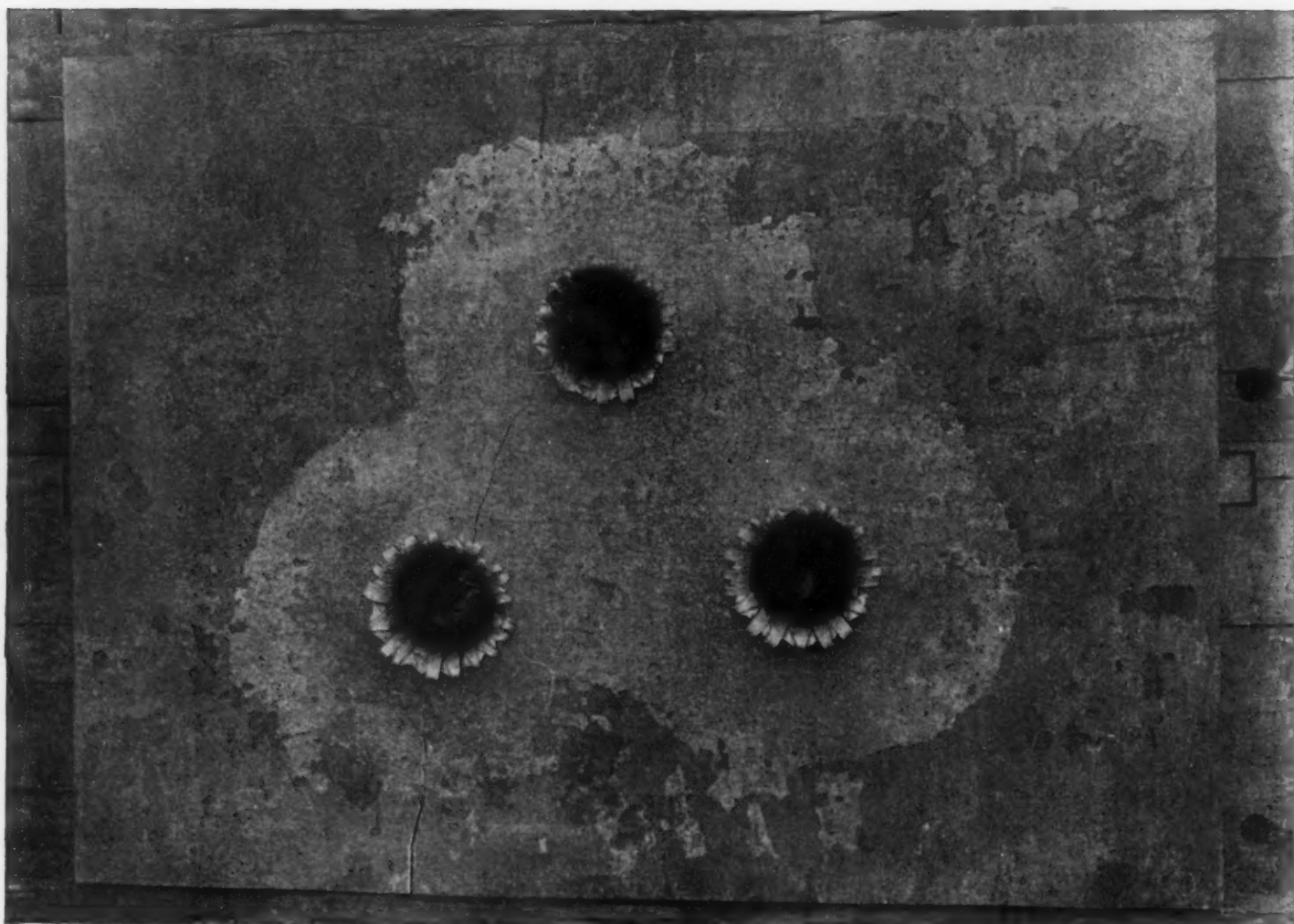
Under the claim of the superiority of the nickel-steel plate the Secretary of the Navy secured an appropriation of \$1,000,-

a company for the treatment in which cracking is the dominant feature, although penetration is greatly decreased and the destruction to the projectiles very great. Subsequent investigation has shown in transverse specimens taken from the nickel-steel plate a very radical decrease in the percentage of elongation, and Mr. Barba has pointed out that the superiority of the nickel steel plate was as much, if not more, due to the great experience in treatment and manipulation as to the percentage of nickel alloy.

When the Annapolis board placed the nickel-steel plate first in the order of merit, its superiority and toughness were attributed to the percentage of nickel alone. Mr. Barba has said that the value of nickel was that it increased "notably the degree of hardness" (which will probably increase the tendency to crack), and that he "did not see the necessity of seeking so earnestly the suppression of cracks, since they did not exercise any in-



ROUND No. 1.



ROUND No. 3.

EXPERIMENTAL STEEL 11½ INCH ARMOR PLATE

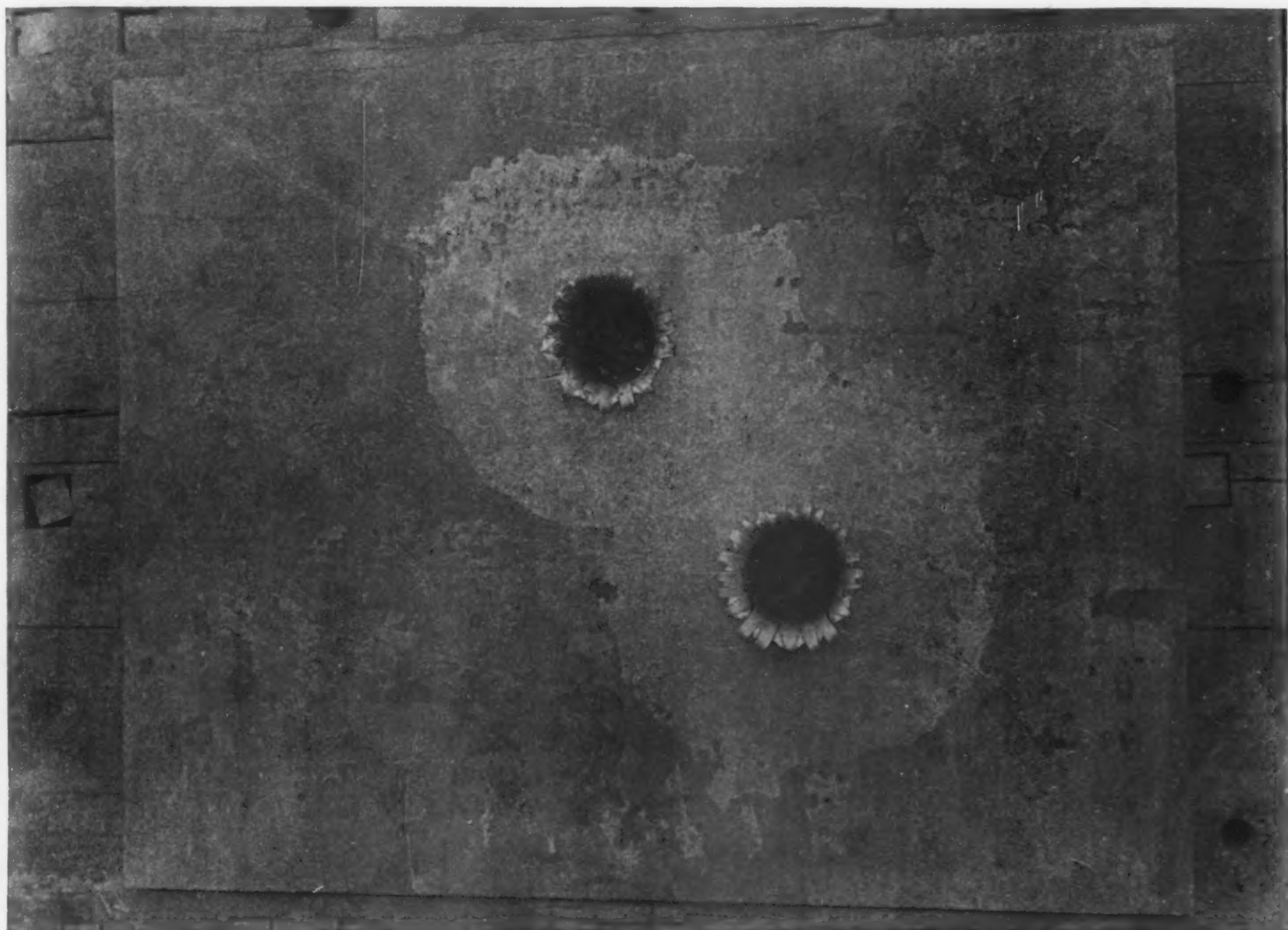
TESTED AT NAVAL ORDNANCE PROVING GROUND, ANNAPOLIS, MD., JANUARY 20, 1891.

DIMENSIONS OF PLATE, 6 FT. X 6 FT.

GUN.—NAVY 6 IN. B. L. R., MARK III, 35 CALIBERS BETHLEHEM STEEL).

POWDER.

Powder Charge: Round 1, 48 lbs.; Round 2, 48½ lbs.; Round 3, 48½ lbs. Striking Velocity: Round 1, 2032 ft. per sec.; Round 2, 2032 ft. per sec.; Round 3, 2032 ft. per sec.



ROUND No. 2.



BACK OF PLATE.

PLATE, BETHLEHEM IRON CO., SOUTH BETHLEHEM, PA.

FT. X 4 FT. 6 IN. X 11½ IN.

WEIGHT OF PLATE, 12,782 LBS.

SECURED TO 36 IN. OAK BACKING BY FOUR 2¼ IN. BOLTS.

DER.—DUPONT BROWN PRISMATIC.

PROJECTILES.—HOLTZER 6 IN. ARMOR PIERCING, 100 LBS.

2, 2065 ft. per sec.; Round 3, 2065 ft. per sec. Striking Energy: Round 1, 2862 ft. tons; Round 2, 2956 ft. tons; Round 3, 2956 ft. tons.

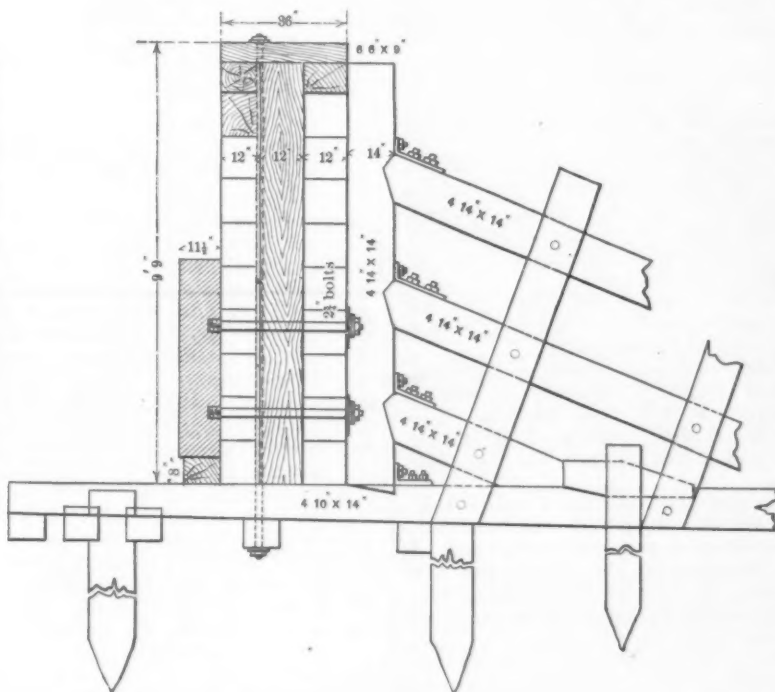
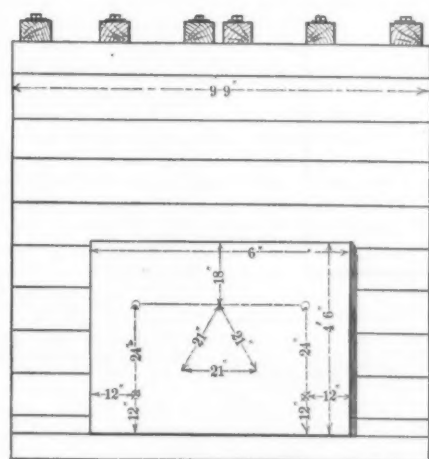
fluence upon perforation." Mr. Barba, it appears, considers fracture a very secondary matter to perforation, a fact that should place the Annapolis all-steel plate ahead of the nickel steel, which had as high as 80 per cent. greater penetration. It was formerly insisted that through cracks should not be allowed, but when they do not expose the supporting structure much will be gained as to penetration because of the greater resistance of the steel.

At the Annapolis trials great credit was taken for the toughness of the nickel-steel plate, although it was more penetrat-

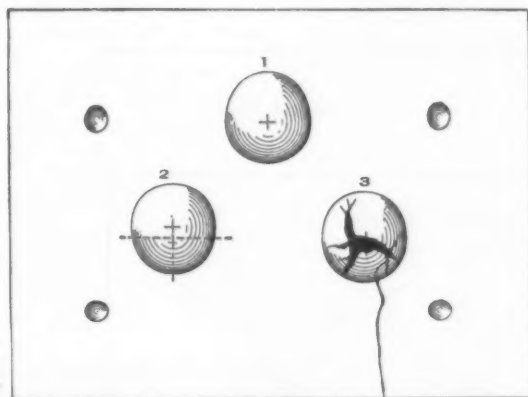
of common shells, the best plate must keep out every form of projectile, no matter how small may be the percentage of armor piercers when compared with the common or less formidable shell. If compound plates should behave better under the attack of common shell than all steel (provided the all steel is not penetrated and does not fall off), but do not offer so great resistance to armor piercers as the all steel, they cannot be accepted as the equal of all steel. If there is even a possibility of a ship being attacked at the highest velocity with which experimental plates are now struck, this condition

provision must be made for keeping out everything, for the ablest commanders will have a variety of weapons at their disposal for attack, and will use such as will most readily overcome the kind of defense with which they may fall in.

Thomas Vickers, whose opinions upon technical steel manufacture retain the high position so long accorded them, in following the medium course between toughness and hardness has secured a well-earned success, and has earned the reward of being to-day the first British manufacturer to receive from the Admiralty an order for all steel armor for the belt of



Armor Plate Trials.—Front and Side Elevations of Target Before Attack.



Back of Plate at End of Trial.

ive, but the acquisition of non-cracking qualities thought to have been proved by this example received a check when the Schneider nickel steel was tested at Ochta. With the probable employment of high explosives, perforation is a serious matter. Although the dimensions of the explosive chambers of shells were decreased in order to obtain a form of projectile possessing positive armor penetration, now that this penetration has been secured, the tendency will be to seek greater destruction after perforation by the use of high explosives. If this be accomplished, resistance against perforation will become the prominent quality to be secured.

Even from the standpoint of admitting (which I do not) the inferiority of all-steel to compound plates in the resistance

should undoubtedly enter into the consideration of the efficiency of the plate.

Ships must be protected to meet the exceptional as well as the ordinary conditions of service, for it is the unexpected that always happens. Because ships may fight at 1500 or 2000 yards (or even at greater distances), that is no argument for protecting them only for that distance. Mr. White aptly compares the condition of attack and defense when he says: "It is but fair to remember that in a battle of the plates and the guns the attack was free and variable, while the defense was not. The attack might say we have to deal with a different kind of armor, and we will use a form of projectile more suitable to destroy it." In seeking the highest development of armor protection,

an important battle ship. As my faith in and recommendations of, steel armor have never been for a moment weakened from the commencement of my investigations, the present state of the art is extremely satisfactory to me. My conclusions may be briefly stated. All open competitive trials have shown the all steel to be superior; the last test at Annapolis conspicuously so.

My objections to compound iron and steel armor have been fully stated in previous papers, and no progress in its manufacture has as yet removed any of the objections I have set forth. The iron back is of no value except for its mass, as it is not expected to assist much in keeping out the shot after the steel face is flaked off.* From a glance at these opinions it would seem that the components of ballistic resistance will all, or nearly all, be found among the following: Perforation, penetration, deformation of the back of the plate, uniformity, through cracks, detachment from the supporting structure, injury to the supporting structure, and the shattering effects of heavy projectiles.

In the order of merit, those plates should be entitled to the first place which show the greatest resistance against perforation, have the least penetration, do not expose the supporting structure, break up the projectiles, and (since all plates cannot be tested ballistically) can be manufactured so as to secure the most uniform results.

* This want of "power of the face plate to adhere to the foundation," and the "cost (sacrifice) of a junction of the two metals" to obtain the hard steel face, constitute prominent weakness of this system.

I still advocate the compound steel plate which I suggested in 1886, and I hope soon to be able to state that it has been brought to a successful issue by experiments that are now progressing. The all-steel plates manufactured by Bethlehem possess a very high ballistic resistance, as shown in the accompanying drawings and descriptions of an 11½ experimental plate tested in January last at Annapolis with the same 6-inch gun that was employed in the September trials. The excellent condition of the back of the plate and the good elongation are particularly noticeable, and illustrate the progress in this direction that Bethlehem has already accomplished.

Information trial (ballistic test) of a 11½-inch Bethlehem press-forged steel plate, Annapolis proving ground, January 20, 1891.

Weather—cloudy, damp. Temperature, 40° F. Firing commenced 10 a.m.

Dimensions of plate, 6 feet by 4 feet 6 inches by 11½ inches.

It was secured to the backing with four bolts 2½ inches diameter. The backing (36-inch oak) employed was the same (repaired) as that used for the Creusot nickel-steel plate at the Annapolis trials of September 18 and 22, 1890.

It must be noted that there were but four securing bolts, and that there were no side, top and bottom plates.

Plate—Steel press forged, oil tempered; number of bolts, 4; diameter of bolts, 2½ inches; total bolt cross section, 23.76. Weight of plate—pounds, 12,782; tons, 57.06; bolt section per ton of plate, 4.164.

The gun used was the 6-inch B.L.R., Mark III, 35 calibers long, employed at the Annapolis trials previously mentioned. It was fabricated at the Washington Gun Factory, and made of Bethlehem steel.

The powder was brown prismatic, manufactured by Messrs. Dupont.

The projectiles (Plate 5) were all Holtzer 6-inch armor-piercing shell, with ogival of two calibers radius, and were brought up to the standard weight of 100 pounds by filling them with sand and lead.

The firing was at a slight depression.

The pointing was done by means of central cross hair sights in the axis of the bore. The gun was fired by means of electric primers and dynamo.

Velocities were taken for the first and second rounds. For the third it was assumed to be the same as for the second.

To meet the requirements of the specifications there were required: *

Striking velocity.....2097 feet.
Striking energy.....3048 feet T.

Lieutenant Commander Dayton was limited by the bureau to a pressure of 15 T. This, and the low temperature, prevented his securing the required velocity and consequent energy.

The offer to warm the plate was declined.

Round 1. Plate 1.

Muzzle velocity.....2057 feet.
Striking velocity.....2032 feet.
Striking energy.....2982 feet T.
Powder charge.....48 pounds.

The point of impact was 18 inches from the top, and an equal distance from the two sides. The projectile penetrated to a depth of 12½ inches, and rebounded entire to a distance of 25 feet in front; it was shortened 0.1 inch. A front bulge was raised 11 inches in diameter and 1 inch high, with a uniform fringe projecting ½ inch; or height of fringe from face of plate 1½ inches. Six short radial cracks were developed in the bulge. One small piece of fringe scaled off. The surface of the shot hole was smooth and regular—diameter of entrance 6 inches. The backing and bolts undisturbed.

* Calculations of Lieutenant C. A. Stone, Bureau of Ordnance.

Round 2. Plate 2.

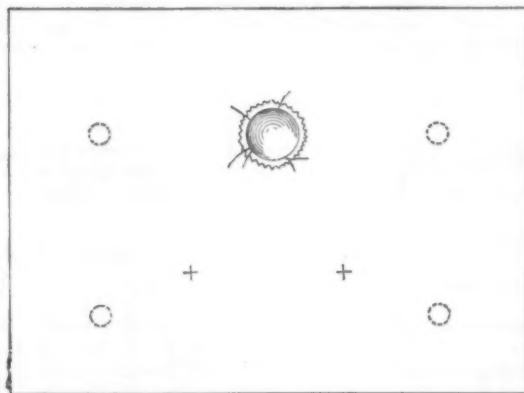
Muzzle velocity.....2091 feet.
Striking velocity.....2065 feet.
Striking energy.....2956 feet T.
Powder charge.....48½ pounds.
Pressure.....14.55 T.

The point of impact was 25½ inches from the right side and 19.81 inches from the bottom. The projectile penetrated to a

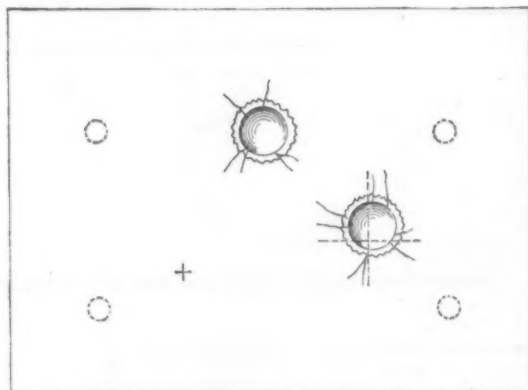
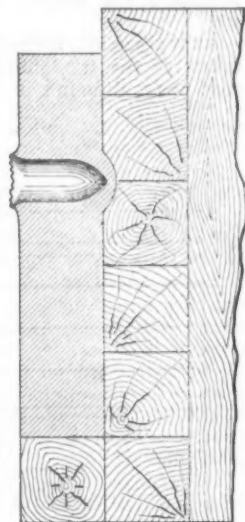
Round 3. Plate 3.

Muzzle velocity.....2091 feet.
Striking velocity.....2065 feet.
Striking energy.....2956 feet T.
Powder charge.....48½ pounds.

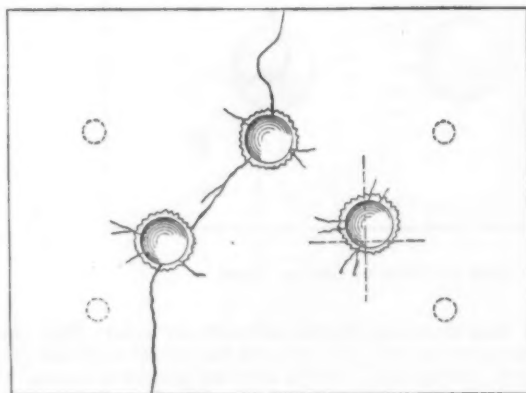
The point of impact was 25½ inches from the left side, and 17.81 inches from the bottom. The projectile penetrated to a depth of 13½ inches, and rebounded 25



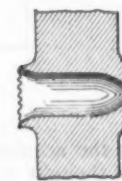
Armor Plate Trials.—First Round.



Second Round.



Third Round.



depth of 13 inches, and rebounded entire to a distance of 35 feet directly in front; it was shortened 0.1 inch. A front bulge was raised 12 inches in diameter and 1 inch high, with a uniform fringe projecting ½ inch; or height of fringe from face of plate 1½ inches. Eight short radial cracks were developed in the bulge. The surface of the shot hole was smooth and regular—diameter of entrance 6 inches. The backing and bolts undisturbed.

feet in front of the target, breaking transversely into two large pieces at the beginning of the ogive; the fracture showed a very uniform fine grain.

A front bulge was raised 12 inches in diameter and 1 inch high, with a uniform fringe projecting 1 inch; or height of fringe from face of plate 2 inches. One through crack developed below shot hole, extending to bottom edge of plate, but did not expose backing. Fracture uni-

form fine grain. A fine surface crack connected hole No. 3 with hole No. 1, and a surface hair crack extended from hole No. 1 to top of plate. Four short radial cracks also developed. The surface of the shot hole was smooth and regular, and showed star-shaped cracks at its inner extremity, just exposing the backing—diameter of entrance 6 inches. The backing and bolts undisturbed, but plate very slightly started from backing.

January 21 the plate was removed from the backing. An examination of its back, Plate 4, showed it to be in excellent condition. The back bulges were uniformly curved, with no indication of fracture or cracks around their circumference.

Round 1.—Back bulge 11 inches diameter, 1½ inch high.

Round 2.—Back bulge 12 inches diameter, 1½ inches high. Faint hair crack 2½ inches in center of bulge.

Round 3.—Back bulge 12 inches diameter, 1½ inches high. Star-shaped cracks with radii from 1½ to 3 inches, one through crack below shot hole, extending to bottom edge of plate, one fine hair crack 6 inches long half way between holes 1 and 3. The indents in backing conformed to back bulges of plate. Backing not splintered.

With the exception of one small piece of fringe, which scaled off in the first round, no particle of the plate was detached. See accompanying blue print, Plate 6, for graphic description of target, appearance of plate after each round, and the back of plate after removal from backing.

W. H. JAKES,
Ordnance Engineer.

It has been stated so frequently that the British compound plates were not subjected to rigid inspection during and subsequent to manufacture that I have been very much interested in the statement of the Chief Constructor that the Admiralty practice was to carefully inspect the manufacture and to test physically and chemically all armor plates that have entered into recent British warship construction. It would be still more interesting to learn what those requirements are in order that they may be compared with the United States practice, which is very rigid and exacting.

There are so many makers of armor now in the field that some more definite nomenclature than all steel and compound must be adopted, as these terms are not sufficiently definite to cover the numerous types. We already have Schneider metal, Terni metal, Kolpin metal, Cammel (Wilson) metal, Brown (Ellis) metal, Bethlehem metal, Harvey metal, Dillenger metal, Marrell metal, Vickers metal, Chatillon et Commeny metal, St. Chamond metal, with others entering the race, all seeking first place.

Before concluding my remarks I desire here to correct the impression given by Mr. Evrard in his letters to *Le Génie Civil*, that Messrs. Schneider & Co. are installing at Bethlehem a plant for the manufacture of steel armor. This is not the case to the extent implied. Bethlehem has had free consultation with Creusot, but has built its own plant, which in many points differs radically from Creusot.

The contract for the erection of the first large building on the grounds of the World's Columbian Exposition at Chicago was let on the 23d ult. The structure is to be known as the Mines and Mining Building, and architects had estimated its cost at \$250,000, but the competition among builders for the honor of putting up the first World's Fair edifice ran the lowest bid down to \$214,219, or 14 per cent. less than the estimated cost. Contractors from Minneapolis, Cleveland and St. Louis competed with Chicago builders for the work. The exposition authorities

decided to divide it, and the lowest bidders were as follows for the parts named: Carpentry work, Burnett, Record & Chapman of Minneapolis, \$99,500; iron work, King Iron Bridge Company, Cleveland, \$57,525; exterior covering, Phillipson Decorative Company, Chicago, \$34,800; lathing and plastering, Burnett, Record & Chapman, Minneapolis, \$2100; painting and glazing, same firm, at \$5700; modeling in plaster, Leopold Bonet, Chicago, \$4835. Agnew & Co. of Chicago had the lowest bid for roofing and skylights, but Chief Burnham said the plans for that work might be changed, and at his suggestion the bid was rejected. According to the terms of the specifications, successful bidders must file heavy bonds for the proper performance of their work within a given time. In the case of most bidders, this time expires on December 31, 1891.

Improvement in the Manufacture of Mineral Wool.

A very important step in advance in the manufacture of mineral wool was taken some time since by the Western Mineral Wool Company, with offices at Cleveland, Ohio, Chicago, Ill., and St. Louis, Mo. It has more recently been incorporated in a patent issued to Charles H. Rockwell, the head of the company named. The common plan of making mineral wool is to utilize the molten slag as taken from a blast furnace in the usual course of furnace work. The central idea in the original invention was the utilization of what would otherwise be a waste product, but to the plan of taking the slag from the blast furnace in a metal car, transferring it to the blowing device, where it is tapped and blowing the wool as the slag runs from the car, there are several very important objections.

In the first place the production of mineral wool upon this plan necessarily depends upon the operation of the blast furnace and when, for any reason, the blast furnace fails to supply the molten slag the manufacture of the mineral wool must stop. Another objection is that only a single carload of slag can be done from one run or flush of the furnace, which fact shows that the supply of material is necessarily limited. A third objection is the unevenness of the slag as it comes from the blast furnace. Much of the slag drawn fails entirely to make mineral wool or results in a product of inferior quality. The suitability of the molten slag can be determined oftentimes only by the results of the blowing and when the operations have been defective it can only be disposed of as waste. Accordingly, the run of the furnace is lost and time and labor are expended in disposing of the useless slag. Again, the entire slag product of some blast furnace, by reason of the nature of the ore used, is wholly unfit for the manufacture of mineral wool. And a fourth objection is that even where the slag is of correct quality a large portion of each carload becomes cool before it can be used and the cool portion is lost.

The object of Mr. Rockwell's inventions, above referred to, has been to overcome these objections and to obtain an unlimited supply of molten slag and to make the wool by a continuous process. By experiment he discovered that by mixing lime or silica, or silica-bearing stone, with the ordinary slag and fusing the mixture in a cupola, a constant supply of remelted slag could be obtained from which a mineral wool may be produced of better and more uniform quality than is produced by the slag drawn direct from a blast furnace. At the same time each of the several objections above recited is overcome. Whether silica or lime, or both, shall be used depends entirely upon

the nature of the slag. This, he explains, is readily determined by one or two inexpensive trials, and accordingly, it is in the power of the manufacturer to arrange his mixture to produce a perfect article at all times.

At the works of the Western Mineral Wool Company, Cleveland, two cupolas are at present in use. It is found, by trial, that about 12 hours' run can be obtained from a cupola before the lining gives out. With two cupolas working alternately night and day a continuous run is obtained, and upon this plan the company are at present proceeding. In 1885, the first year of the company's business, 300,000 pounds of mineral wool were produced and sold. In 1890 no less than 9,000,000 were manufactured and sold, while for the current year the output will be considerably greater.

Mineral wool has diminished in price, as well as improved in quality, during the last few years, and is at present in large demand in various directions. It is extensively used for insulation in cold storage warehouses, refrigerator cars and also by packers, brewers and others, to say nothing of the demand that exists for it in regular building work. It has been demonstrated that it is one of the very best insulating materials now before the public, and some very interesting tests are on record going to prove this fact. The material is applied as a covering for steam pipes, and is also used as a boiler covering, being prepared in convenient shape for this purpose.

New Form of Marine Engine.

English technical journals are describing the new Clyde-built paddle steamer's engines, constructed on the much-talked-of disconnective triple-expansion principle. These engines are of the diagonal direct-acting type, and have two 28-inch high-pressure cylinders, placed behind a 56-inch intermediate and an 86-inch low-pressure cylinder, with a stroke of 66 inches; a high and low pressure cylinder work tandem on one rod, and a high and intermediate on the other, in connection with a double-throw shaft. There is only one set of stuffing boxes between each pair of cylinders, and there is ample space for the easy removal of the intermediate and low-pressure cylinder covers, which are also fitted with manholes and doors for examining the pistons without disturbing the covers; all the pistons have deep cast-iron packing rings, held up to the bore of the cylinders by short spiral steel coils. The two high-pressure cylinder valves are of the piston type, the intermediate being on the Trick principle, and the low pressure is double ported. The valve motion consists of the double-barrel link type, and is actuated by one of Brown's steam and hydraulic reversing engines, the starting lever of which, along with the lever for the throttle valves, is brought to the main deck platform, and constitutes a particularly simple arrangement, as, there being two high-pressure cylinders, no starting valves are required, and it is impossible for the engine to stick on the dead centers.

The Providence and Stonington Steamship Company have contracted for two more new steamers. The vessels are to be of steel, and will be 300 feet in length, 60 feet wide, and will draw 12½ feet of water. They are to be propellers, and will be fitted up in first-class style, with all modern machinery and conveniences. On the decks will be room for 100 cars of freight and also 100 staterooms for the accommodation of 200 first-class passengers. The contract calls for the finishing of the two boats on June 1, 1892.

Fire-Brick Hot-Blast Stoves.

The first three-pass stove had the combustion chamber to one side, from which the gases flowed in a right line across the stove, entering the down pass on top, and from it entering the chimney pass at the bottom, and then through the chimney pass directly out of the chimney. This was the simplest possible construction, and left nothing to be wished for in the way of efficiency, except that the first stoves were made with fine checker work in the last pass, which by carelessness clogged, checking the draft, and thereby limiting the amount of gas that could be consumed.

The plan had, however, two structural defects. One was the introduction of the blast into the chamber under the chimney above the third pass checker work. A powerful blast blew out the clay in which the bricks were laid and weakened the division wall above the checker work between the second and third passes. The bricks forming the top course of the chimney pass checker work were also displaced in the same manner. By introducing the blast into the bottom of the chimney just below the chimney valve all these difficulties were overcome. The blast then descended directly on top of the checker work, and, not striking any of the walls, did not blow out the clay. This defect has been very common in fire-brick stoves, and would not have been particularly noticed in either the Whitwell or Cowper, but in any new type all the difficulties are well heralded.

The second structural weakness was the large top arch which spanned the entire stove from side to side, the span of the arch being practically the same as the diameter of the stove. It was found that this arch gave way under heavy duties. The span was too great, and changes of temperature from gas to blast had too much effect upon it. It did not give way entirely, but bricks fell out. These bricks were made to interlock, and therefore broke away without the arch tumbling in. No attempt was made to overcome this defect while the circular iron-top construction was adhered to, and it remained for the complete remodeling of the stove, as shown in cut, to overcome it, and to secure a substantial construction throughout.

The arch now spanning the combustion chamber and covering the first down pass has a span of just half the diameter of the stove, under which there is ample play for the gases, giving every opportunity for a utilization of all the checker work of the down pass. On top of this substantial short-span arch are built the flues to convey the gases from the top of the chimney pass to the chimney and the bottom brick work of the chimney proper. This work increases the stability of the arch and places between it and the iron shell sufficient material to prevent the latter from being injuriously heated at any time, no matter how strongly the stoves are worked.

This arch cannot provide an opening for the passage of the gases directly to the chimney. To reach the chimney the gases must pass down to the bottom and up the chimney pass. The gases from the combustion chamber enter the down pass, and having passed through it, enter through large arches into the chamber beneath the two symmetrical passes, forming a chimney pass, and rising through them give off their remaining heat to the checker work, and are received on top into chambers above the checker work. From each of these segmental passes there are two flues or passages, making four in all, leading to the base of the chimney. The side combustion chamber has been

adhered to. It is theoretically true that if the highest heats be confined to the center of the stove there will be less loss by radiation, but this loss is not appreciable, while the side combustion chamber can be cleaned more readily and a better diffusion of gas and larger heating surface obtained. The first stoves ever constructed by Mr. Cowper had the central combus-

vides about the same amount of brick to the area of the pass, and gives about the same area for the passage of the gases or air. The cost of constructing the brick is about the same with either type, but it has not been demonstrated that the round has any particular advantages over the square opening. Experience has proven that a 9-inch opening is the most desirable

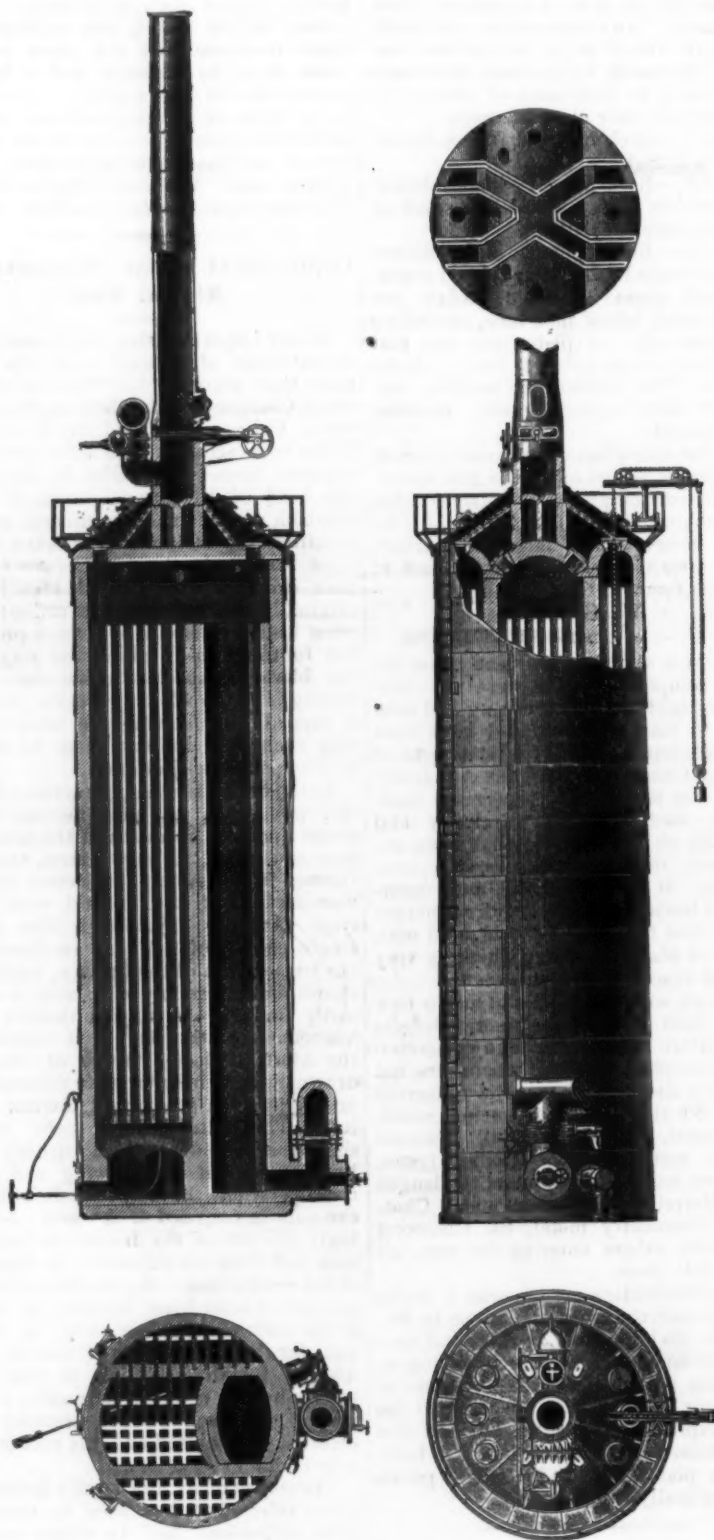


Fig. 1.—Hot-Blast Stove.

tion chamber, the gases descending all around it. This type was then abandoned and never revived until quite recently.

The checker work in all cases has 4½-inch walls and 9-inch openings, which are either square or circular. The circular flue is preferred by some, as it is thought that a round flue will not collect dirt as rapidly as a square one. This plan pro-

vide throughout a stove. The stove keeps clean for a reasonable time without attention; excessive friction is avoided, while a fair amount of heating surface is secured. Flues larger than 9-inch impair the heating surface while increasing the capacity to burn the gases. There may then be too much fuel burned for the amount of surface to absorb the heat in the time allotted

and frequent changes will be required or an objectionable fall in the blast temperature experienced.

The system of cleaning by blowing steam directly with the current of the gases, from the bottom upward, has enabled the three-pass stove to be efficiently employed for a period of three and one-half years without once stopping for cleaning or repairs, and then with only three-fourths of an hour's attention every week, and without stopping the stove for an instant. Besides, there is a top-cleaning device, consisting of weighted scrapers

ing their full duty, the chimney power being more than exhausted in pulling the gases down the down pass and through the valves and flues leading to the chimney. Their draft is due entirely to rarification of the gases in the combustion chamber, less this excess of pressure. Hence the three-pass stove, with an outlet on top, gains by a simple hole more than all the power of draft which the two or four pass stove can possibly have.

The draft has everything to do with the capacity of the stove, as its power is a measure of the quantity of fuel that can

is a prime consideration. There is no part of a furnace plant less liable to give trouble than the modern three-pass fire-brick stove, and it can be cleaned while in use. The brick work is massive. The brick wall between the shell and the combustion chamber is 22½ inches thick. The shell never gets so hot that the hand cannot be placed upon it and held there. The cross division walls are made 13½ inches thick. The arches are 18½ inches, and the bottom brick work is formed of massive piers and walls, sufficient to withstand a height of 150 feet.

The valves have been revised, remodeled and improved after 15 years' experience. The chimney valve, Fig. 2, is just the same as it has been for the last five years. The efficiency with which its valve and seat are cooled by the incoming currents of air, induced by draft, renders it thoroughly durable. Its simple construction precludes liability to disarrangement, and as it is withdrawn entirely from the currents of the gases

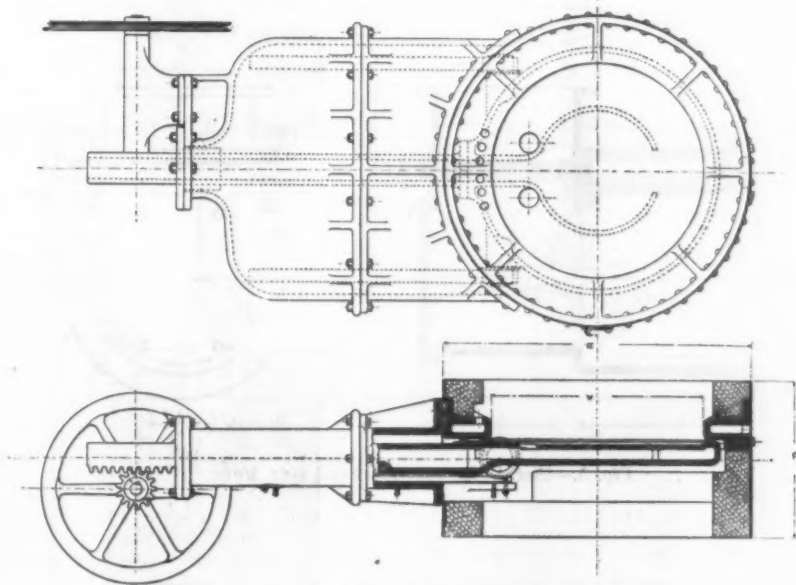


Fig. 2.—Chimney Valve.

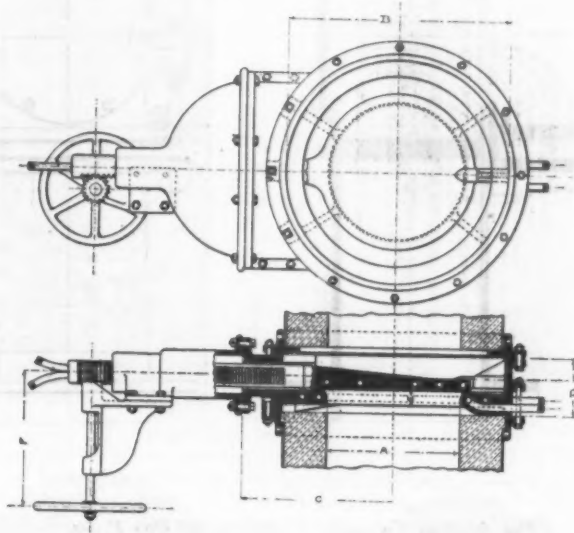


Fig. 3.—Hot-Blast Valves.

operated by chain wheels on a carriage tracking around the stoves, so the cleaning may be effected through any door with equal facility.

The efficiency of the draft must be measured at the bottom of the combustion chamber, where the gas and air enter, and when the stove is doing the full duty for which it is designed. To insert a manometer in the draft stack is to measure the power provided for the work without determining the power required. To measure the draft in the combustion chamber measures what power is left after all the work is done. It is a fact that ordinary detached chimney stoves of the two or four pass type have a pressure of gas within the stove on top when they are do-

be consumed in the stove in a given time, and that is a measure of the quantity of heat provided.

One of the 20-foot three-pass stoves consumes the entire gas coming from a coke or anthracite furnace when making 100 tons of iron per day. Two will, therefore, heat the blast for a product of 150 tons of iron per day to a temperature of 1400 to 1500 degrees. In ordinary practice, about one-third of the gas coming from a furnace is used for heating the blast. The objection heretofore raised, that a stove could not be heated as rapidly as cooled, is removed. The objection to two fire-brick stoves, on the assumption that one may give way, and by its failure stop the furnace, is not well taken where economy of construction

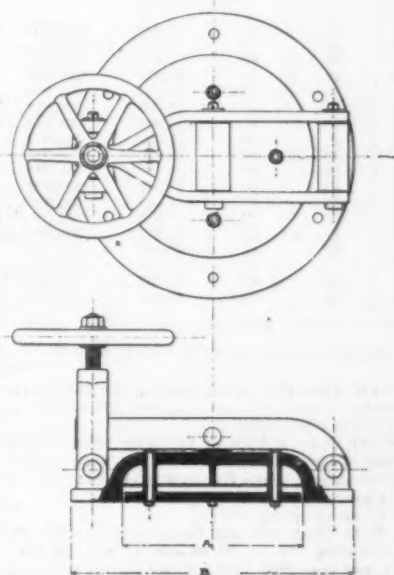


Fig. 4.—Air Valve.

when it is opened, it neither impedes these currents nor is injured by them. This form is therefore employed in preference to the mushroom or poppet valve, which, though less expensive, so seriously interferes with the chimney currents, while it is exposed to the heat of the waste gases. The cold-blast valve is a simple slide device, seated by gravity. The hot-blast valve, Fig. 3, is a water-cooled valve, with a removable seat of cast iron, coursed with lap-welded tubing. This is preferred to bronze castings, as by the stoppage of the water the bronze will crack, whereas the wrought-iron pipe, well protected with cast iron, will withstand the highest temperature of blast for a considerable length of time without being injured. The whole valve is of cast iron, and is bolted between machined faces, which are in turn riveted to the hot blast pipe. Either the whole valve body, cap and all, can be removed, the cap and the valve removed, or the water-cooled seat removed at pleasure, and very promptly, and any portion of these part can be replaced by duplicates made to templates.

The air valve, Fig. 4, is a flat surface valve, held to its seat by a heavy wrought-iron bale. It is not affected by the heat, as it is so far removed from it, being entirely different from the original type of air valves introduced with these stoves. The gas valve, Fig. 5, is a heavy plate operated by double racks and pinions, introduced between two cast-iron flanges in the

gas conduit. It serves as a cut-off or as a regulating valve. The valve, playing between the flanges, is always exposed to view, and can be kept clean without difficulty. Clamp screws either release or tighten this plate to fix it against the pressure of the blast. Its employment is essential, as it precludes the possibility of the gas entering the gas mains, which was so common with the older types of gas-inlet valves. Stoves of equal size cost practically the same, whether Cowper, Whitwell or three-pass, but a plant of either of the two former types requires a chimney, chimney foundations and chimney flues, which, added to the cost of the stoves, enhances the cost far beyond that of a three-pass plant of equal power.

Number of stoves.	Diameter of casing.	Height to base of chimney.	Cubic feet of blast that can be heated to 1500° F.	Pounds of coke or anthracite per 24 hours.
14	60	60	6,800	123,000
15	60	60	8,200	155,000
16	60	60	9,300	176,000
17	60	60	11,000	209,000
18	60	60	12,500	237,000
19	60	60	14,000	266,000
20	60	60	16,000	304,000
21	60	60	18,000	342,000
22	60	60	20,000	380,000
14	60	60	10,000	190,000
15	60	60	12,000	228,000
16	60	60	14,000	266,000
17	60	60	16,500	314,000
18	60	60	18,500	351,000
19	60	60	21,000	399,000
20	60	60	24,000	459,000
21	60	60	27,000	513,000
22	60	60	30,000	570,000

MANAGEMENT OF FIRE-BRICK STOVES.

Control the flow of the gas by the gas valves at all points of exit, keeping the gas mains always under pressure.

Never open a bleeder valve or other outlet on top of the furnace or other elevated point.

To change a stove from gas to blast:

Close gas valve,

Close chimney valve,

Note that hot air comes out of the air valve. If so, close air valve. If not, see that chimney is fully closed; then—

Close air valve,

Open cold-blast valve slowly,

Open hot-blast valve quickly.

To change from blast to gas:

Close hot-blast valve,

Close cold-blast valve,

Open air valve within half till air pressure is nearly gone; then throw it wide open,

Open chimney valve fully,

Open gas valve to mark for temperature desired.

The *Financial Chronicle* in an article on our trade relations with Europe finds that in the five years ending in 1885 the world owed the United States on the face of the trade returns the enormous sum of \$517,000,000. Since 1885 the net exports, including gold and silver, have been as follows:

Net exports in 1886.....	\$59,781,384
Net exports in 1888.....	3,887,789
Net exports in 1889.....	116,988,178
Net exports in 1890.....	41,864,488
Net exports in 1891.....	41,060,665

Total balance in our favor in five years.....	\$263,582,504
Total in previous five years....	517,280,086

Total for ten years.....	\$780,862,590
Less excess of imports in 1887..	18,389,933

Total..... \$762,472,657

This indicates that in the ordinary course of trade Europe has become a debtor to us, in the last ten years, of \$750,000,000. We have steadily been the creditor of the world in the current merchandise account. The foreign countries, the *Chronicle* points out, were large buyers of our railroad and other securities in the first five years of the last decade. There is no doubt that they have been large sellers of railroad securities, especially in the last two years, but during

this period they have been reinvesting part of the cash thus realized in industrial shares. The *Chronicle* thinks that the cessation of the demand by Europe for our railroad securities sufficiently accounts for gold exports at this time.

Transportation on the Great Lakes.

Superintendent Porter has issued advance copies of a bulletin on transportation and floating equipment on the great lakes, from which it appears that the total number of vessels plying on December 31, 1889, was 2784; the total gross tonnage

000; 495 tugs, valued at \$2,617,000; 41 ferry boats, valued at \$500,000; 57 pleasure yachts, valued at \$331,000; 15 pile drivers, 4 sand dredges, 7 fire boats, 4 steam lighters and 58 unclassified steam vessels. There are 929 schooners, valued at \$4,250,000; 301 lake barges, valued at \$1,463,000; 47 sloops and 7 scows. Steam vessels comprise five-sixths of the value and a little less than one third the tonnage of the entire floating equipment.

Mail advices bring the first intelligence of the account of the contest between the torpedo boats Condell and Lynch, who

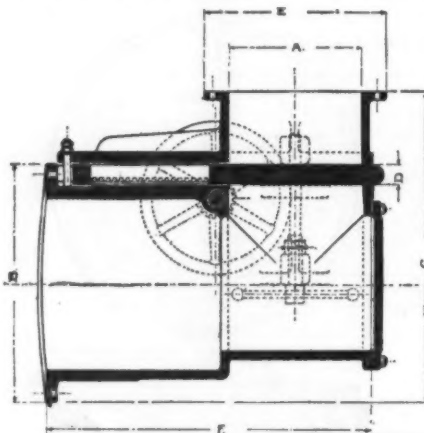


Fig. 5.—Gas Valve for Overhead Gas Main.

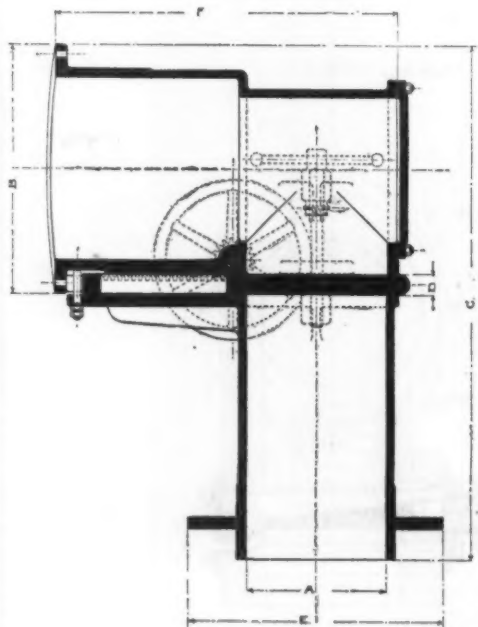


Fig. 6.—Gas Valve for Underground Gas Flues.

924,472 and the total net tonnage 780,119. The estimated carrying capacity of these 2784 vessels was 1,254,271 tons, the commercial valuation of which was \$48,809,750.

More than one-half of the vessels are assigned to the ports of Chicago, Port Huron, Detroit, Milwaukee, Grand Haven, Cleveland and Buffalo. Chicago has the largest number of craft, 339; Port Huron, 293; Detroit, 275; Milwaukee, 259; Grand Haven, 225; Cleveland, 219; and Buffalo, 204. Cleveland has the greatest tonnage, 163,000; Detroit second with 130,000; Buffalo, 129,000 and Chicago, 71,000. Port Huron and Milwaukee have a tonnage of 61,000 each and Grand Haven 20,000. There are 67 side-wheel passenger vessels, valued at \$2,815,000; 30 propellers carrying both passengers and freight, valued at \$11,000,000; 433 propellers carrying freight only, valued at \$23,000,-

sank the *Encalada*, a Chilean insurgent cruiser, in Caldera Bay. The attack was made at three o'clock in the morning on April 23, when the *Encalada* was at anchor and had her fires banked. The two torpedo boats fired six of their torpedoes at the *Encalada* without effect, in the meantime working their Hotchkiss guns, while the heavier guns of the *Encalada* did execution particularly on the *Condell*. The seventh torpedo struck the cruiser, which sank. It seems that the *Encalada* did not really have its torpedo net out.

As Premier Sir John Macdonald is supposed to be near his death a feeling prevails that a consequence of that event might be eventually the submission to the United States of proposals for reciprocity measures in trade so unobjectionable as to find strong support on both sides of the national boundary

Plate Nomenclature.

W. C. Cronmeyer of Demmler, Pa., has addressed the following letter to J. W. Britton, president of the Tinned-Plate Manufacturers' Association of the United States:

DEMMLER, PA., June 1, 1891.

Complying with a request which was made by the last meeting of the Tinned-Plate Manufacturers' Association, I herewith submit in brief my views regarding a new nomenclature for sheet iron, sheet steel and tin and terne plate.

The anomalous condition of the various designations now in use was very fully illustrated in the paper which was read by Mr. Kittredge at our last meeting; but to

nearly 40 pounds that for all practical purposes that weight can be adopted as a standard; then after we have obtained the thickness of a plate in decimal parts of an inch we merely have to multiply that decimal by 40 and we get the weight per square foot.

In designating the quality of the iron or steel contained in the plates, I would not advocate any standard denomination, but let each manufacturer have his own, and in that establish the individuality of his brand. Some will make plates from Bessemer steel, other from open hearth, and some again from Clapp & Griffith, Thomas Gilchrist or open-hearth basic steel, and some may even have an opportunity to furnish plates made from old-style charcoal or coke blooms.

letter to you, I have complied with their request. For want of more time I have to reserve some further remarks until our next meeting.

Decoration Day Fire in Chicago.

The Keene Block, at Carroll avenue and Sheldon street, Chicago, was wrecked by fire on the 30th ult. It is a five-story brick structure, 50 x 150 feet, built last year. The loss by fire is \$130,000. The day being a holiday, the 200 men employed in the building were not at work. W. O. Worth, the inventor of the Worth bicycle and chief owner of the Chicago Bicycle Company, was showing A. L. Jordan, the St. Louis agent of the company, the manner of making the machines. Together they stepped into the japanning room, where bicycles are japanned by placing them in a hot oven. This is heated by gas. Worth stepped into the huge oven and lighted a match. Gas, which had escaped from the pipes, exploded with a tremendous detonation. Worth was thrown 20 feet against a wall. Another explosion of gas or japan, or both, quickly followed, filling the room with flame, crashing down all three partitions and wrapping Worth and Jordan in flames. The men dashed through the blaze and ran down stairs into the street with the fire blazing about them. Both the men fainted and were hurried away in a patrol wagon to the County Hospital. They were badly burnt, but may survive. The structure, owing to the efficient work of firemen, was little damaged below the second floor except by water. The occupants of the building were: The Chicago Spring Butt Company. The firm occupied the basement, first, fifth and a part of the fourth floors. Their stock and machinery were valued at \$50,000; loss \$30,000, fully insured. The Chicago Bicycle Company occupied the second floor. There were 100 bicycles, materials for 1500 more and 25 "bikes" left there for repairs. The loss is \$50,000; insurance, \$1000. The Trenton Wire Mattress Company occupied the third floor. This is a branch of the company at Trenton, N. J. Their loss is \$20,000; insured. H. S. Maynard's chemical laboratory filled a part of the fourth floor. The loss is \$5000; insurance, \$1000. The building was put up two years ago at a cost of \$50,000. It was owned by Keene Bros., who were also proprietors of the Chicago Spring Butt Works. The damage to the building is \$25,000.

The annual report of the Pulaski Iron Company has just been issued for the year ending March 31, 1891. The company own the Pulaski furnace, the plant, with houses, &c., being valued at \$324,424.07, while the mineral properties aggregate 2369 acres, which represent, including 200 shares of the Virginia Mining Company at cost, \$150,640.74. During the fiscal year the furnace was out of blast for repairs 68 days and other stoppages carried the total to 103 days. During the time that it was in actual operation, 262 days, the furnace made 30,401 tons, equivalent to 116.4 tons per day, at an average cost of \$12.01. The total ore consumption of the furnace was 71,168 tons, the average yield of which was 42.71 per cent. During the first six months of the fiscal year the average net price received at the furnace for pig iron sold was \$13.08, while during the last six months the net price was \$12.72, the average for the entire year being \$12.88. There was paid a 10 per cent. dividend on \$300,000 capital on May 15, 1890, and in August and November of 1890, and February, 1891, a dividend of 2 1/2 per cent. for each quarter on \$450,000 capital. The bonds of the company amounted to \$150,000, having been cancelled and exchanged for stock at par.

Designation of Thickness by Number of Wire Gauges in Use.

Old Birmingham.	New Birmingham.	Brown & Sharpe.	Designation of tin plate.	Thickness in part of an inch.	Weight per square foot in pounds.	Proposed designation (weight per 100 square feet). Pounds plate.
No.	No.	No.				
.....	20	18	.....	0.04	1.6	160
.....	.....	.....	.....	0.0300	1.568	157
.....	.....	.....	.....	0.0350	1.435	144
20	21	19	.....	0.0351	1.4	140
21	.....	.....	.....	0.0325	1.3	130
.....	22	20	DXXXX	0.3196	1.278	128
.....	.....	.....	.....	0.03125	1.25	125
22	.....	.....	.....	0.0285	1.14	114
.....	.....	.....	.....	0.02846	1.138	114
.....	23	21	DXXX	0.0278	1.11	111
.....	.....	.....	.....	0.02535	1.014	101
23	.....	22	.....	0.025	1.00	100
.....	.....	.....	.....	0.0247	0.9904	100
.....	.....	.....	DXX	0.0242	0.97	97
.....	.....	.....	IXXXX	0.0232	0.93	93
.....	.....	23	.....	0.02257	0.93	90
24	25	.....	DXX & IXXX	0.022	0.88	88
.....	.....	.....	.....	0.02075	0.83	83
25	26	24	.....	0.020	0.80	80
.....	.....	.....	.....	0.0196	0.7844	78
26	.....	.....	.....	0.0187	0.755	75
.....	.....	25	IXX	0.0179	0.716	72
27	27	.....	.....	0.0174	0.698	70
.....	.....	26	.....	0.0159	0.636	64
28	28	27	IX	0.0156	0.625	63
.....	29	.....	.....	0.0142	0.568	57
.....	.....	.....	.....	0.0139	0.556	56
.....	.....	28	.....	0.0130	0.52	52
.....	.....	.....	IC	0.0126	0.504	50
.....	30	.....	IC	0.0125	0.5	50
.....	.....	.....	IC	0.0123	0.492	49
30	.....	.....	IC	0.0121	0.484	48
.....	31	29	IC	0.01125	0.45	45
31	.....	.....	.....	0.011	0.44	44
.....	32	30	.....	0.010	0.4	40
.....	.....	.....	.....	0.0098	0.392	39
32	.....	31	.....	0.0090	0.36	36
.....	33	.....	.....	0.00893	0.3572	36
.....	.....	32	No. 36 ga.	0.0086	0.348	35
33	34	.....	.....	0.00795	0.318	32
.....	.....	33	.....	0.0075	0.3	30
34	35	34	No. 39	0.007	0.28	28
.....	.....	.....	.....	0.0069	0.276	28
.....	36	34	.....	0.0063	0.252	25
.....	.....	35	.....	0.0061	0.244	24
.....	37	.....	.....	0.0056	0.224	22
.....	.....	36	.....	0.0054	0.216	22
35	.....	.....	.....	0.005	0.2	20
.....	38	37	.....	0.0048	0.192	19
.....	.....	.....	.....	0.00445	0.178	18
36	.....	.....	.....	0.004	0.16	16

add another proof, how unreliable is the present ruling custom of designating the thickness and weight of plates and sheets by numbers? I herewith submit a comparative table of numbers of several of the wire gauges and the tin-plate denominations, together with the thickness in parts of an inch and the weight per square foot, and also my suggestion for a substitute, which simply is to call all sheets or plates by their respective weights per hundred square feet.

If my suggestion should be adopted we would have the designation 100-pound plate for No. 24 New B. G.; 63-pound plate for No. 28 N. B. G. or IX; 50-pound plate for No. 30 gauge. or IC, and so further, as the table shows.

By this method all those vexatious mistakes which occur by confounding the different standards, or by measuring the thickness with an old worn gauge, would be obviated. To find out quickly the weight per square foot, even without having a testing scale handy, we can measure the thickness with a micrometer. A square foot of iron or steel 1 inch thick is 30

The present designations for coating tin and terne plates as "charcoal" and "coke" finish should be dropped, as they are nonsensical. The method of the coating process should be stated as "acid tinned" or "oil tinned" or "electric tinned," if the latter process should come into use, as may not be impossible. The amount of coating which is put on the plates should be stated in percentage.

In regard to the number of sheets per box or the weight per box, I have no definite suggestion, but think that we could adopt a system so that each box of tin and terne plate would contain an equal and even number of superficial square feet; or, in other words, I would make the number of square feet the standard rather than the number of sheets; but in this respect, as well as on the changes in general, I think we should listen to suggestions from consumers and workers of tin and terne plates, and my object in submitting this is to bring out a discussion—and having been requested by the editors of *The Metal Worker* and the *American Manufacturer* to furnish them copies of this

The Iron Age

New York, Thursday, June 4, 1891.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - - EDITOR.
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS - - - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.

Southern Steel.

Southern iron makers are deeply interested in all questions affecting the manufacture of steel in that section of our country. They realize that they have gone far enough in the production of crude pig iron and that harmonious development calls for work in another direction, the manufacture of steel. There is now in operation at Chattanooga one small basic open-hearth plant, which has been running successfully and which has succeeded in taking orders for its total output for a prolonged period. This plant is using only charcoal iron, with 3 per cent. of phosphorus, very low silicon and sulphur. We know, however, of a large Northern rolling mill which has been using ordinary Southern coke iron in its basic furnace for some time past. But after all, the manufacture of steel in this manner is subject to certain limitations, the principal ones being that the chemical composition of the pig iron must lie within given specifications and that the supply of cheap scrap must be ample.

Southern makers have, therefore, turned hopefully to the duplex process, which they hope will enable them to meet the Northern makers of soft acid steel in the leading markets of the country. They have been assured again and again that technically there are no obstacles except high sulphur. We present elsewhere a discussion on the subject from the pen of one of our ablest steel makers, which brings up some points worthy of serious consideration. We print also an admirable article by Gram Curtis of Pittsburgh, a very well-known designer of steel plant, which deals with the mechanical features of the problem.

Commercially those who go into the manufacture of basic steel by the duplex process, using the ordinary Southern coke iron as a raw material, will have a very difficult piece of work before them. They must be prepared to deliver common billets in neutral markets on the basis of \$25 to \$26 at Wheeling or Pittsburgh, since that figure may be regarded thus far as the minimum price at which billets can be sold. It is true that they did go lower this year, touching \$24.50, but that is an exceptional price which prudent men may well dismiss when discussing the basis upon which their enterprise must be established.

As will be seen by the text of the bill published elsewhere in this issue, the Illinois Legislature has fallen in line with the law makers of a number of other

States in endeavoring to suppress trusts and combinations. The penalties prescribed by the Illinois measure are very severe. The first offense of a corporation, company, firm or association is punishable by a fine of not less than \$500 nor more than \$2000; the second offense, not less than \$2000 nor more than \$5000; the third offense, not less than \$5000 nor more than \$10,000, and every subsequent offense, \$15,000. Any officer of a company or any individual found guilty under the statute may be punished by a fine of not less than \$200 nor more than \$1000, or be confined in the county jail not to exceed one year, or he may be both fined and imprisoned in the discretion of the court. Provision is also made for rewarding informers by giving them one-fifth of the fines recovered. The measure is sweeping in its provisions, and it is difficult to see how under it any trust or combination can continue to do business in Illinois.

The Identity Feature of the Drawback System.

During the past few weeks the public prints have had repeated references to the value of the increased drawback on foreign raw material re-exported in manufactured form by American shops. Under the McKinley act the sum refunded upon re-export was increased from 90 to 99 per cent. of the duties paid on the raw material imported. The complaint has been made, and is to a considerable extent justified by the facts, that so much trouble is involved in procuring the drawback that it is not worth the while of American manufacturers to produce for neutral markets from imported material. We have gathered information on this subject from a number of manufacturers who are doing a re-export business of this character, and find that to some extent the complaints made against this system are justified.

The entire system has been made the subject of indiscriminate attack simply because its largest beneficiary is the Standard Oil Company, who avail themselves of it for nearly the whole of the metals which go into the packages in which they ship petroleum for export. But even in their case the difficulties incident to the system as now in force have led to its abandonment for at least one purpose, that of hoops for their petroleum barrels. Inquiries seem to develop the fact that all the troubles are the outgrowth of the demand on the part of the Government that the re-exported goods be made of the identical material imported for the purpose. This identity feature in the drawback system involves a constant watchfulness and an increased cost in manufacturing which certainly is entirely unnecessary. American manufacturers must practically divide their stock of raw material, of product in course of manufacture and of finished goods into two groups—that destined for the domestic trade and that intended to be re-exported. They must practically carry on two con-

cerns in one place, with all the added expenditure and superintendence this involves.

It is difficult to understand on what grounds identity is insisted upon. Manufacturers should have the right to import a certain amount of raw material, paying duty thereon, and giving notice at the same time of their intention to re-export a corresponding quantity of finished goods, an allowance being made, as at present, for waste and loss in manufacture. As soon as they export a corresponding quantity of goods, the quantity being recorded under proper precautions, then the duty less 1 per cent. should be refunded, without any reference whatever to the fact that the goods are made from foreign or from domestic material. The identity clause in the present drawback regulations should go.

Our Agricultural Exports.

Pending questions of finance, variously related to the national currency, carry with them a cautionary sign in regard to the conduct of general business. As by common consent the times are understood to be unpropitious for engagement in any enterprise such as involves more than a minimum of commercial risk. Capital is, therefore, commonly characterized as "timid." It is not usually thought worth while to attempt to forecast the future with any pretense of certainty respecting what may or may not happen.

This waiting attitude is the dictate of common prudence rather than the expression of actual apprehension or extreme conservatism. Whether warranted or groundless, the position is safe and constitutes in itself a ground of confidence, because opposed to undue expansion and tending to insure stability of credit. To answer satisfactorily the question whence this peculiar disposition, so characteristic of the times, might be difficult.

The discussion of the silver coinage question, by suggesting grave possibilities, has accustomed the public mind to a state of suspense and unrest. Again, the political uncertainties of Europe give rise periodically to anxious contemplations respecting the Danubian principalities, and all eyes are directed every spring to the Balkan Mountains, the building of strategic railroads on the Russian frontier or to the customary mobilization of troops. Or disquieting rumors may have no other support than a disposition on the part of certain governments to strengthen their gold reserves or to contract new loans. At times all signs become a significant omen of possible disturbance which may affect all markets.

Some of these foreign influences of late have been quite potential on this side of the Atlantic, added to those of domestic origin, but Americans meanwhile have seen \$50,000,000 in gold leave the country with surprising equanimity, assured that all would be well in the final adjustment of accounts. The principal ground of assurance was found in the agricultural resources of the country, in its exportable

surplus of commodities, its cotton, grain, provisions, beef, oil and tobacco, to go in settlement of trade balances. It is ascertained now almost beyond a peradventure that an enormous winter wheat crop of an exceptionally fine quality will soon be harvested. Not a single State average is reported lower than 93. A consideration of scarcely less importance is that any excess of production beyond domestic wants will be promptly convertible into gold to supply the shortage of Europe.

In France it is officially estimated that the deficiency in the wheat crop this year will be about 80,000,000 bushels, and the reports are also bad as to Holland, Belgium and North Germany. Respecting Russia the accounts are conflicting, but the action of the French and German governments with reference to future supplies shows that there is a widespread conviction that imports must be large.

A glance at the latest bulletins of the Washington Statistical Bureau will suffice to show that reliance upon the crops is not a false dependence as an offset to the drain of gold.

The total exports of breadstuffs, provisions, cotton and petroleum for ten months, ending with April, were as follows, compared with previous years:

1890-91.....	\$548,793,429
1889-90.....	539,676,367
1888-89.....	458,217,831

The conspicuous feature is the extraordinary exports of cotton, this single item having doubled in April last, compared with April, 1890, and for eight months the aggregate value of cotton exported is no less than \$263,000,000, despite the very low prevailing market quotations, almost the lowest on record. The low price, however, acted as a stimulus to the foreign demand. It is noticeable, at the same time, that the exports of manufactured cotton of late have doubled, the demand for China showing the largest increase. The decrease in breadstuffs is explained by the partial failure of the corn crop.

Uncle Sam is sometimes represented as searching his pockets for small change—i. e., subsidiary coin—in the effort to make both ends meet, but superficial examination of assets is sufficient to dismiss fears of immediate bankruptcy.

An event for which all Chicago had been rather impatiently waiting occurred in that city on May 23. It was the award of the contract for erecting the first large exposition building. Other buildings are to be put in the hands of contractors rapidly from this time, and by midsummer the work of construction will be well under way on all the buildings contemplated by the exposition managers, employing, it is estimated, at least 15,000 hands. The greatest immediate benefit of this important enterprise will, of course, be received by Chicago, and its business men are justified in expecting an expansion in many lines of trade, but other parts of the country will of necessity be drawn upon for essential materials, so that the effect of the great work now fairly in hand at

Chicago will be widespread. Those who have but a sentimental interest in the exposition cannot fail to be gratified also at the announcement that the buildings are at last being erected, and upon plans which surpass in extent and splendor any previous achievements by international expositions, because enthusiasm will be kindled afresh in every direction, and doubters will be silenced.

Western Capital Increasing.

Western financiers are calling attention to the fact that a marked change has quite recently developed in the commercial circles of that section. It had been the custom among prominent merchants and large manufacturers to send their paper to New York or Boston for discount because Western banking facilities and Western capital were not equal to the demands made upon them. The West now appears to have outgrown this condition of dependence upon the older sections of the country. Commercial paper is being purchased in the large Western cities by representatives of banks scattered throughout the Western country. The corn and wheat belt now discounts its own paper and is thus rapidly becoming independent of Eastern financial ties. Had it not been for this change in the condition of affairs, it may with truth be said that the financial stringency of last November and December would have strewn the West with wrecks of business enterprises of every character. The Western country banks sustained many a manufacturer and brought him safely through that critical period who must have failed irretrievably but for them. The strength of the banks of Chicago and St. Louis is due not alone to the concentration of wealth in and about those two cities, but also to the rapid development of wealth in the territory tributary to them. The banking capital of these and other Western financial and business centers is steadily increased by the prosperity of the banks in the districts lying round about them. The diversification of industries in the West has at last brought about this result, which is surely of sufficient importance to be noted.

Correspondence.

Silicon and Sulphur in Bessemer Pig

To the Editor: In the discussion of rapid Bessemer work, issue of *The Iron Age*, 28th inst, E. C. Potter says: "It is impossible for any works or any group of works to run continuously on iron below 1 per cent. in silicon simply because it is impossible for any blast furnace to make this character of iron regularly and uniformly, and of sufficient purity, especially as regards sulphur, for steel making." I have found no difficulty at either our Cedar Point or Port Henry furnaces (three in all) in making Bessemer iron regularly and uniformly low in both silicon and sulphur. Since we commenced running on Bessemer iron about a year and a half ago silicon has averaged less than seven-tenths of 1 per cent. and sulphur from a trace to 2 per cent., exceeding the latter figure only when the sulphur in the coke was abnormally high. Yours, &c.,

N. M. LANGDON, Supt.
PORT HENRY, N. Y., May 30.

Washington News.

(From Our Regular Correspondent.)

WASHINGTON, D. C., June 1, 1891.

Among the souvenirs brought back by the President and Mrs. Harrison from their Pacific Coast journey is a nicked hatchet, wrought out of a bolt from the coast defense vessel Monterey. The head of the bolt forms the head of the hatchet, and the end of the shank, flattened, forms the blade. The handle is of the same material, welded in.

Another memento is a souvenir spoon of oxidized silver, embossed. In the bowl is represented Mrs. Harrison touching the electric button which sent the great hulk of steel down the ways into the element of her future services; and Mrs. McKee, touching a similar button which broke a bottle of the best vintage of California over the bow of the vessel as she moved gracefully away. The array of souvenirs is not only large, numbering 400, but is a magnificent exhibit of the mineral and vegetable wealth and marvelous ingenuity of the people of the Pacific Coast and Rocky Mountain States and Territories. Gold and silver and ores of a long list of metals are conspicuous features of the collection.

The Census Office has issued two more interesting bulletins under the head of Mines and Mining. The mica production, it is shown by census statistical research by L. Y. Childs' report, is confined to the States and Territories of New Hampshire, North Carolina, Virginia, South Dakota, New Mexico, Massachusetts, Wyoming and Idaho. The greatest output during the decade was in 1884, 147,410 pounds, valued at \$369,000. The output of the census year 1889 was 49,500 pounds, valued at \$50,000. The high-water mark in mica mining, 1883-84, realized high prices and an active market is due to the large sheets used in stove panels. The change in styles in stoves and use of small sheets rendering the production unremunerative, the producing mines were reduced. Consequently stove manufacturers and other consumers were compelled to raise the price of mica or look to foreign sources for supply. The extended manufacture of dynamos and other electrical apparatus also stimulated importation.

The Canadian mica has a superior cleavage, but improved methods have proved that the United States can produce mica for electrical purposes equal to any found abroad. The value of unmanufactured mica imported into the United States in 1889 was \$97,357. The amount of capital invested in the United States is \$692,000, of which \$439,000 is in North Carolina. New Hampshire has \$195,000 invested, but better facilities for steady and systematic mica mining. The following interesting data on the occurrence, treatment of the crude product and uses of mica is woven into the census story among the tabulated statistics of this industry:

"Mica is one of the natural constituents of a number of the more common rocks, and as such is widely distributed throughout the United States, but the localities in which it occurs in an available form are not very numerous. While deposits have been noted in nearly all of the States on the eastern border of the Appalachian Mountain system, it is only in New Hampshire and North Carolina that the industry has assumed at any time much importance. In the West the most important deposits are located in the Black Hills, in the neighborhood of Harteville, Wyoming, and in the Cribbensville district of New Mexico.

"The available deposits of mica occur in bands or coarsely crystalline granite. In these bands the three constituents of the

granite (mica, feldspar and quartz) have in a measure crystallized in separate masses and the mica is found in bunches or pockets irregularly distributed throughout the mass. The deposits are of great interest, aside from their commercial importance, on account of the number of rare minerals which are nearly always present. Among these are beryl, tourmaline, garnet, columbite and samarskite. In some cases one or more of these minerals is present in sufficient quantity and of such fine quality as to give value to the deposit. Some of the finest tourmalines in the world have been found at Mount Mica, near the town of Paris, Maine, in the mica deposit at that place. Tin ore is also an accompaniment of the mica deposits in the Black Hills region.

"Mica is used in two forms, sheet mica and ground mica, and the manner in which it is treated when taken from the mine depends upon the form in which it is to be used. If it is to be sold as scrap for grinding, all that is necessary is to remove the adhering fragments of quartz and feldspar and such parts of the mica as may contain foreign ingredients. If it is to be used in the sheet form the process is much more complicated, the blocks being first split into sheets thin enough to cut easily, then marked with a pattern of the size desired, cut along the lines marked, and the different sizes wrapped in paper and packed for shipment. There is a great amount of waste about this operation. The amount of sheet mica obtained does not usually exceed from 4 to 8 per cent. of the block mica treated.

"The most common and well-known use for mica is in the paneling of stove and furnace doors. For this purpose the mica must be clear, free from spots, and of a uniform color throughout the sheet. The most desirable color is a wine red, and next to this comes white mica, which is nearly as valuable. Another important use is in the manufacture of electrical apparatus, for which purpose its non-conducting properties render it valuable. The qualities required for this use are firmness of texture, toughness and ready cleavage.

There is a greater range of use for ground mica than for the mineral in sheets, and though the value of that part of the product made use of in this form is small, the many peculiar properties which ground mica possesses render it quite probable that its use will be widely extended. The difficulties to be overcome in grinding mica are considerable, and there are only two or three firms engaged in the business at present. Eight standard grades of ground mica are made. The coarsest of these are used to give frosted and spangled effects to the fancy grades of wall paper. The medium grades are employed in the manufacture of a lubricant for the journals of railway carriages, for heavy bearings generally, and for the axles of road vehicles. The finest grades are used in producing a uniform metallic white surface on wall paper. Scrap mica for grinding must be white and as free from specks or colored matter as possible, since any impurities in the scrap will affect the color and luster of the product."

The report of Dr. William C. Day, in giving the statistics of the production of blue stone, also presents an interesting exhibit of this branch of mining industry. This stone, so almost universally used for flagging, curbing, &c., and considerably for street paving, is quarried only in New York, Pennsylvania and New Jersey, the output being respectively 4,000,000, 1,100,000 and 16,000 cubic feet, valued at \$1,303,000, \$373,000 and \$8600.

Originally the stone was quarried for flagging only, but in recent years it has been applied to a long list of purposes, as rubble masonry, retaining walls and bridge stone, sidewalks, crosswalks, curbing, gutters, flagging, stepstones, flooring,

vault covers, bases of tombstones, porch and hitching posts and house trimmings, as platforms, steps, door and window sills, lentels and caps.

The production is confined to 24 counties in New York, 10 in Pennsylvania and 3 in New Jersey. The stone is a variety of sandstone.

The Secretary of the Treasury has authorized collectors of customs on the Mexican frontiers to forward ores containing lead which are destined for other ports, under warehouse and transportation bond, the examination, weighing and assaying to be made at the port of destination. In estimating the duties the entire importation must be regarded as lead ore. The usual importer's bond must be given and transportation must be in sealed cars over duty-bonded routes.

Electric Motors for Railroad Use.

The *National Car Builder*, in a series of articles on "Some Consideration of Electric Motors for Railroad Use," has brought out many points of interest to all who use motors. In regard to the efficiency of any motor doing any desired work it says:

First, it is necessary to determine the highest speed at which the motor will be called upon to do any considerable work. This with a given motor and constant amount of wiring used will be the point of maximum efficiency. To make this efficiency as great as 90 per cent. requires a large motor in proportion to the work to be done; 80 per cent. is as high efficiency as can be reached at speed in train service without employing larger motors than are really practicable at the present time. Hence, when a train is running at its maximum speed the efficiency of an electric motor driving such a train may safely be taken at 80 per cent.

If a train should start at New York and run to California without stopping, on a comparatively level road, the efficiency of the entire operation might be 80 per cent., as the inefficiency at starting would be lost in the long-time run at a high efficiency. But railroad work is performed in a different way. Take, as an extreme case—but one for which the electric motor is often suggested—the suburban service in our great cities, either elevated or surface. The train operation is something like this: A train starts from a station, puffs out as hard as possible, reaches maximum speed, shuts off power, runs along for a short distance, and the brakes are applied. Power is used only during the accelerating or "getting under way" period. During this time the efficiency of a steam locomotive varies about 25 per cent., while that of a series electric motor varies from zero to 80 per cent. of its capacity. The average efficiency during the whole distance between stations, then, would be but 40 per cent. at the best. If, however, there is any delay at starting with the electric locomotive, as there often is with the steam locomotive, then there will be a considerable further loss, which will reduce the average efficiency below 40 per cent. A steam locomotive may pull for hours on a train without starting it, and yet use little or no steam, and hence suffer but little as regards general efficiency.

An illustration of the immense increase in travel caused by the substitution of cable for horse cars may be had in the experience at Pittsburgh, Pa. The Citizens' Street Railway of Pittsburgh began operating by cable January 1, 1889. In 1888 the horse cars transported 6,952,000 passengers; in 1890 they carried no less than 11,640,000. The Pittsburgh Traction Company commenced operating by cable November 1, 1888. In 1888, with horses, this line carried

1,690,000 passengers, and in 1890, with its cable system, 8,171,000 dropped their nickels in the slot.

Galvanized Iron Weights and Discounts.

We are indebted to Wm. E. Stockton, Western manager for the Moorhead-McCleane Company, 16 and 18 West Lake street, Chicago, for the following interesting information regarding galvanized iron weights and discounts:

Bundles.

The table below shows the number of sheets of galvanized iron or steel generally placed in a bundle, together with the average weight of a bundle. The first column of figures indicates the gauge, the second the width and the third the length of the sheets. The table is confined to 96-inch sheets, as they are the standard. No. 16 gauge is shipped loose:

	Size. Inches.	Sheets in bundle.	Average weight of bundle. Pounds.
No. 18	24 x 96.....	5	184
	26 x 96.....	4	158
	28 x 96.....	4	169
	30 x 96.....	4	184
No. 20	24 x 96.....	6	159
	26 x 96.....	5	169
	28 x 96.....	5	154
	30 x 96.....	5	164
No. 22	24 x 96.....	7	140
	26 x 96.....	7	151
	28 x 96.....	6	139
	30 x 96.....	6	153
No. 24	24 x 96.....	10	162
	26 x 96.....	9	160
	28 x 96.....	8	152
	30 x 96.....	8	165
No. 25	24 x 96.....	11	148
	26 x 96.....	10	152
	28 x 96.....	8	161
	30 x 96.....	8	157
No. 26	24 x 96.....	11	155
	26 x 96.....	9	150
	28 x 96.....	9	160
	30 x 96.....	7	156
No. 27	24 x 96.....	11	149
	26 x 96.....	10	148
	28 x 96.....	9	143
	30 x 96.....	9	151
No. 28	24 x 96.....	12	144
	28 x 96.....	10	145
	30 x 96.....	9	143

Weight per Square Foot.

The following table shows the comparative weight per square foot, with the list price per pound of galvanized sheets:

Gauge.	Weight per square foot. Ounces.	Price per pound. Cents.
14.....	60	12
16.....	48	12
17.....	43	12
18.....	38	12
19.....	33	12
20.....	28	12
21.....	24	13
22.....	21	13
23.....	19	13
24.....	17	13
25.....	16	14
26.....	15	14
27.....	14	15
28.....	13	16
29.....	12	16

The number of square feet in a sheet is as follows.

	Square feet.
24 x 96 inch.....	16.
26 x 96 inch.....	17.33
28 x 96 inch.....	18.66
30 x 96 inch.....	20.
32 x 96 inch.....	21.33
36 x 96 inch.....	16.24
24 x 101 inch.....	16.84

Discount Tables.

As galvanized sheets are sold at a discount from the list price, the calculation

Net Price of Galvanized Sheets per Pound at Different Discounts.

Gauge.	List price.	50	50-2½	50-5	50-7½	50-10	52½	52½-2½	52½-5	52½-7½	52½-10
12 to 20	12	6.00	5.85	5.70	5.55	5.40	5.70	5.55½	5.41½	5.27½	5.13
22 to 24	13	6.50	6.33½	6.17½	6.01½	5.85	6.17½	6.02½ ⁶⁰	5.86½ ⁶⁰	5.71½ ⁶⁰	5.55½
25 to 26	14	7.00	6.82½	6.65	6.47½	6.30	6.65	6.48½ ⁶⁰	6.31½ ⁶⁰	6.15½	5.98½
27	15	7.50	7.31½	7.12½	6.93½	6.75	7.12½	6.94½ ⁶⁰	6.76½ ⁶⁰	6.59½ ⁶⁰	6.41½
28	16	8.00	7.80	7.60	7.40	7.20	7.60	7.41	7.22	7.03	6.84

Gauge.	List price.	55	55-2½	55-5	55-7½	55-10	57½	57½-2½	57½-5	57½-7½	57½-10
12 to 20	12	5.40	5.26½	5.13	4.99½	4.86	5.10	4.97½	4.84½	4.71½	4.59
22 to 24	13	5.85	5.70½	5.55½	5.41½	5.26½	5.52½	5.38½ ⁶⁰	5.24½	5.11½ ⁶⁰	4.97½
25 to 26	14	6.30	6.14½	5.98½	5.82½	5.67	5.95	5.80½	5.65½	5.50½	5.35½
27	15	6.75	6.58½	6.41½	6.24½	6.07½	6.37½	6.21½ ⁶⁰	6.05½	5.89½ ⁶⁰	5.73½
28	16	7.20	7.02	6.84	6.66	6.48	6.80	6.63	6.46	6.29	6.12

Gauge.	List price.	60	60-2½	60-5	60-7½	60-10	62½	62½-2½	62½-5	62½-7½	62½-10
12 to 20	12	4.80	4.68	4.56	4.44	4.32	4.56	4.38½	4.27½	4.16½	4.05
22 to 24	13	5.20	5.07	4.94	4.81	4.68	4.87½	4.75½ ⁶⁰	4.63½	4.50½ ⁶⁰	4.38½
25 to 26	14	5.60	5.46	5.32	5.18	5.04	5.25	5.11½ ⁶⁰	4.98½	4.85½	4.72½
27	15	6.00	5.85	5.70	5.55	5.40	5.62½	5.48½ ⁶⁰	5.34½	5.20½ ⁶⁰	5.06½
28	16	6.40	6.24	6.08	5.92	5.76	6.00	5.85	5.70	5.55	5.40

Gauge.	List price.	65	65-2½	65-5	65-7½	65-10	67½	67½-2½	67½-5	67½-10	70
12 to 20	12	4.20	4.09½	3.99	3.88½	3.78	3.90	3.80½	3.70½	3.51	3.60
22 to 24	13	4.55	4.43½	4.32½	4.20½	4.09½	4.22½	4.11½ ⁶⁰	4.01½	3.80½	3.90
25 to 26	14	4.90	4.77½	4.65½	4.53½	4.41	4.55	4.43½	4.32½	4.09½	4.20
27	15	5.25	5.11½	4.98½	4.85½	4.72½	4.87½	4.75½ ⁶⁰	4.63½	4.38½	4.50
28	16	5.60	5.46	5.32	5.18	5.04	5.20	5.07	4.94	4.69	4.80

Gauge.	List price.	70-2½	70-5	70-7½	70-10	72½	72½-2½	72½-5	72½-7½	72½-10	75
12 to 20	12	3.51	3.42	3.33	3.24	3.30	3.21½	3.13½	3.05½	2.97	3.00
22 to 24	13	3.80½	3.70½	3.60½	3.51	3.57½	3.48½ ⁶⁰	3.39½	3.30½ ⁶⁰	3.21½	3.25
25 to 26	14	4.09½	3.99	3.88½	3.78	3.85	3.75½	3.65½	3.56½ ⁶⁰	3.46½	3.50
27	15	4.38½	4.27½	4.16½	4.05	4.12½	4.02½ ⁶⁰	3.91½	3.81½ ⁶⁰	3.71½	3.75
28	16	4.68	4.56	4.44	4.32	4.40	4.29	4.18	4.07	3.96	4.00

Gauge.	List price.	75-2½	75-5	75-7½	75-10	77½	77½-5	To reduce discount.			
12 to 20	12	2.92½	2.85	2.77½	2.70	2.70	2.56½	Per cent.	Deduct. Per cent.		
22 to 24	13	3.16½	3.08½	3.00½	2.92½	2.92½	2.77½	60 to 62½	6½		
25 to 26	14	3.41½	3.32½	3.23½	3.15	3.15	2.99½	62½ to 65	6½ ⁶⁰		
27	15	3.65½	3.56½	3.46½	3.37½	3.37½	3.20½	65 to 67½	7½		
28	16	3.90	3.80	3.70	3.60	3.60	3.42	67½ to 70	7½ ⁶⁰		

Net Price of Galvanized Sheets per Square Foot at Different Discounts.

Gauge.	Estimated weight per square foot.	List price.	Discount.							
	Ounce.		50	55	60	62½	65	67½	70	
14	60	12	22½	20½	18	16½	15½	14½	13½	
16	48	12	18	16½ ⁶⁰	14½ ⁶⁰	13½	12½ ⁶⁰	11½ ⁶⁰	10½ ⁶⁰	
18	38	12	14½	12½ ⁶⁰	11½ ⁶⁰	10½ ⁶⁰	9½ ⁶⁰	8½ ⁶⁰	7½ ⁶⁰	
20	28	12	10½	9½ ⁶⁰	8½ ⁶⁰	7½	7½ ⁶⁰	6½ ⁶⁰	5½ ⁶⁰	
22	21	13	8½ ⁶⁰	7½ ⁶⁰	6½ ⁶⁰	6½ ⁶⁰	5½ ⁶⁰	5½ ⁶⁰	4½ ⁶⁰	
24	17	13	6½ ⁶⁰	6½ ⁶⁰	5½ ⁶⁰	5½ ⁶⁰	4½ ⁶⁰	4½ ⁶⁰	4½ ⁶⁰	
25	16	14	7	6½ ⁶⁰	5½ ⁶⁰	5½	4½ ⁶⁰	4½ ⁶⁰	4½ ⁶⁰	
26	15	14	6½ ⁶⁰	5½ ⁶⁰	5½	4½ ⁶⁰	4½ ⁶⁰	4½ ⁶⁰	3½ ⁶⁰	
27	14	15	6½ ⁶⁰	5½ ⁶⁰	5½	4½ ⁶⁰	4½ ⁶⁰	4½ ⁶⁰	3½ ⁶⁰	
28	13	16	6½ ⁶⁰	5½ ⁶⁰	5½	4½	4½ ⁶⁰	4½ ⁶⁰	3½ ⁶⁰	

of the net cost is a matter of more or less annoyance to the retailer or consumer. For the convenience of the trade Mr. Stockton has computed the foregoing tables of net price per pound at different discounts, for which he was granted a copyright in 1890.

A supplementary table to the above shows the net price per square foot at different discounts, also copyrighted by Mr. Stockton.

Corey, Moore & Co., smelters and dealers in metals, New Haven, Conn., have removed from Crown street to the old Yale Foundry building, 419 Chapel street, where they occupy much larger and more convenient quarters.

The rod mill of Carnegie, Phipps & Co., at Beaver Falls, which broke down a few weeks ago, has been started up again.

MANUFACTURING.

Iron and Steel.

The separator of the Chateaugay Iron Company, at Iron Mountain, N. Y., was recently burned.

The Pacific Iron and Nail Company of Oakland, Cal., elected the following directors at the annual meeting: H. J. Sadler, president; William Wright, vice-president and general agent; W. F. Mau, secretary; Martin Sachs, treasurer, and R. Sadler.

The Jenifer Iron Company's furnace at Muncie, Ala., is being cooled, after a trial blast, the repairs recently made to the stack being unsatisfactory. The furnace will probably remain idle until September.

Morris, Williams & Bailey of Pittsburgh, manufacturers of cold-rolled steel, have commenced the erection of an iron building 85 x 45 feet in size, which will about double their present capacity. New rolls, engines and the other necessary equipments will be put in, and the present annealing furnace enlarged to meet the increased demands for their product. The works of this firm have been operated night and day for some months past.

The Clinton Furnace of the Clinton Iron and Steel Company, at Pittsburgh, resumed operations last week after an idleness of about three months. During the shut-down the furnace was remodeled to some extent and its capacity slightly increased.

No. 3 Eliza Furnace of Laughlin & Co., at Pittsburgh, Pa., went in blast last week after being thoroughly repaired. The three stacks of the above firm are now in successful operation.

The F. T. Aschman Steel Casting Company, of Sharon, Pa., have applied for a charter of incorporation under the name of the Aschman Steel Casting Company. The incorporators are J. J. Searman, E. A. Wheeler, F. T. Aschman, Edward Roberts, W. S. Roberts, Geo. A. Baird and Fay Alderman. Larger capital will be employed, and the plant of the firm will be considerably enlarged. Although this concern have been in existence for only a short time, they have done an excellent business and report plenty of orders on hand.

The blast furnace of the Belmont Nail Company, at Wheeling, W. Va., has recently been thoroughly repaired and 10 feet has been added to the height of the stack. The furnace is in complete readiness to resume blast, and will probably commence operations within the next ten days.

There is some talk of a ferromanganese furnace being erected at Rome, Ga., by R. F. Williams of New York and others, and a meeting will be held shortly to effect an organization. The capital of the company, including plant and 3000 acres of mineral land in Floyd County, will be about \$300,000. All the plans will be decided on at the forthcoming meeting.

Report has it that the New River mineral Company will build another iron furnace at Ivanhoe, Va., in addition to the Ivanhoe Furnace, now operated by them.

A steel plant is contemplated at Strasburg, Va., by W. G. Carroll, who, it is reported, has leased land with that end in view.

The universal plate mill of the Elmira Iron and Steel Rolling Mill Company, at Elmira, N. Y., has been leased for one year by N. D. Doxey, formerly superintendent of the plate and bar mills of that company, and J. F. Bailey of Philadelphia, together with the engines, machinery, &c., necessary to operate the mill. Operations will begin in about three weeks with a force of 75 men, and the mill will run night and day. It will be remembered that the rolling mill has been idle since June, 1890, when the men went on strike.

During the prolonged idleness of the valley furnaces the owners have made important repairs to their different plants, and when the time for resumption comes all the furnaces will be in the very best of condition for the production of pig iron.

The malleable iron works at Chattanooga, Tenn., have started up. The works have been in course of construction for nearly a year, cost about \$75,000 and will give employment to 100 men.

A movement is on foot at Scranton, Pa., to build a wire drawing plant and nail factory. James Nolan is the originator of the enterprise.

The strike at the Standard Steel Works, Chester, Pa., has come to an end after a three months' struggle between the works and the men. The shops will be known as union shops

hereafter, but no discrimination will be made in favor of either the Brotherhood or I. M. U. organizations.

Mary Furnace of the Ohio Iron and Steel Company, Lowellville, Ohio, has gone into blast after an idleness of nearly four months, and Anna Furnace, operated under lease by the Struthers Furnace Company, Struthers, Ohio, will resume on the 4th inst. Robert Bentley is general manager of both these furnaces, with headquarters at Lowellville.

The Rome Furnace, recently blown in for the first time at Rome, Ga., is turning out 50 tons of charcoal iron per day.

At the annual meeting of the stockholders of the Cleveland Iron Mining Company, held at Cleveland, Ohio, on the 27th ult., the following directors were elected for the ensuing year: E. R. Perkins, T. P. Handy, W. J. Gordon, J. H. Wade, Jr., William G. Mather, Samuel Mather, Peter White, William Bingham and W. S. Tyler.

On the 15th inst. the executors of the will of the late J. H. Shoenberger will offer for sale the decedent's interest in the firms of Shoenberger & Co. and Shoenberger, Speer & Co. of Pittsburgh. The sale will be at public auction, at the Stock Exchange building, at ten o'clock. The property of these firms consists of two large blast furnaces and the Juniata Iron and Steel Works, in Pittsburgh, and 500 acres of coal and 45 acres of surface land in Westmoreland County, Pa. The decedent held a 5-32 interest in the two firms, which interest has been appraised at \$208,079.12. The sale of this interest is rendered necessary in the course of the settlement of the estate.

No. 1 Hubbard Furnace, operated by Andrews & Hitchcock, at Youngstown, Ohio, started up on the 18th inst.

Machinery.

A meeting of the Board of Directors of the Union Switch and Signal Company of Pittsburgh was called for Saturday, May 30, but on account of that being a legal holiday the meeting was indefinitely postponed. It is stated that the affairs of this company are in much better shape now than for a long time past, and that the earnings have been considerably increased, while the expenses have been reduced to a large extent.

The Reliance Machine Company have been incorporated at Minneapolis, Minn., with a capital of \$10,000.

Sullivan & Ehlers, at Albany, N. Y., have completed a building, 110 x 62 feet, for the manufacture of brass castings of all kinds.

The Tacony Iron and Metal Company, who have large contracts with the city of Philadelphia, have decided on the Jenkins & Lingle power hammer, and placed their order through L. & R. Wister & Co., who are sole agents for the manufacturers.

Orders have recently been taken by the Menasha Wood Split Pulley Company of Menasha, Wis., for hickory pulleys from the following concerns: Needham Bros. Ishpeming, Mich.; M. B. Wells & Co., Waupun, Wis.; O. Paulson, Clearmont, Iowa; W. L. & O. Churchill, Alpena, Mich.; R. D. Pike, Bayfield, Wis.; D. J. Murray Mfg. Company, Wausau, Wis.; O. Briggs Mfg. Company, Edgerton, Ohio; Escanaba Mfg. Company, Escanaba, Mich.; A. Smith Mfg. Company, La Crosse, Wis.; Pullman Pulp and Paper Mill, Kaukauna, Wis.; S. K. Wambold & Son, Appleton, Wis., and Jas. D. Hardy, Calera, Ala.

The Nordberg Mfg. Company, Milwaukee, Wis., have removed to their new works, 480 to 486 Virginia street. The building they occupy is a three story brick, 80 x 150, and is especially well adapted to their use in the manufacture of governors and the Clausen friction clutch. They have also begun the manufacture of the Nordberg poppet-valve engine, which is said to be an improvement on the Sulzer engine, manufactured in Germany, some of which were imported by the Schlitz Brewing Company some four years ago. Greater economy, durability and range of cut off are some of the advantages claimed for this engine. Their first engine is 175 horse-power, and will be set up by the middle of June and goes to the Jos. Schlitz Brewing Company, who are familiarly with those they now have gives preference to the improved product. The Nordberg Company employ a working force of from 50 to 60 hands. Additional tools and appliances are being placed in position, and as soon as all are in place they will have very largely increased their capacity and be prepared to meet all demands promptly.

The Murray Metallic Packing Company have been incorporated at Albany, N. Y., with a capital stock of \$25,000. The shares are \$100 each. The object of the company is to manufacture and sell metallic packing, to be used in

engines, pumps and machines of a similar nature. The directors are: Edward J. Murray, Timothy J. Sullivan, Frederick J. Hinkel, William E. McEwen and Edward A. Maher. The office and works of the company will be in the Electric Illuminating Building, on Trinity place.

Probably the largest casting ever transported by the Pennsylvania Railroad Company arrived at Johnstown on the 23d ult., and was consigned to the Cambria Iron Company. It was a half section of a fly wheel and weighed 90,000 pounds. The special car in which it was transported from Philadelphia was borrowed by the Pennsylvania Railroad Company for that purpose from the Baldwin Locomotive Works, the company having no car with a capacity above 40,000 pounds. The other half will be shipped during the present week. The wheel is in halves, bolted together, and when complete is 25 feet in diameter, with a rim 18 inches thick and 28 inches wide. It is for the new 26-inch tilt mill now being erected by the Cambria Iron Company. The engine which will drive this wheel is a compound condensing one of 3000 horse-power, and is being built by the Southwark Foundry and Machine Company of Philadelphia, which concern also made the fly wheel.

Wm. Tod & Co., founders and machinists, at Youngstown, Ohio, are still running their plant night and day, and report quite a large inquiry for engines and heavy machinery. They are now estimating on the power for a tin-plate mill, with a capacity of 350,000 boxes annually, to be built in the vicinity of Chicago.

The contract for building the machine shops of the Norfolk & Western Railroad Company, at Shenandoah, Va., has been awarded to J. J. Pittyjohn for \$50,000.

The J. Morton Poole Company of Wilmington, Del., are erecting a large addition to their machine shops. The addition is 150 x 80 feet, built of iron and brick, with a slate roof, and will be practically fire proof.

The American Machine Company of Philadelphia are financially embarrassed as the direct result of the failure of the Spring Garden bank of that city and the financial panic resulting therefrom. Judgments aggregating \$180,431 have been entered against the company. It is thought that the assets, consisting of the factory at American street and Lehigh avenue, the machinery it contains, the stock on hand and bills receivable, will cover the liabilities.

A machine shop 108 x 40 feet is in course of erection at Barre, Vt., by Whitcomb Brothers.

Jackson Brothers will erect a foundry and machine shop, 100 x 40 feet, at Hillsborough, N. H.

At the Newport session of the Rhode Island State Legislature, held last week, the following acts of incorporation were passed: Rhode Island Steel Casting Company, Collins Safe Door Company, the Congdon, Carpenter Company, Rhode Island Horseshoe Company, Tockwotten Machine Company, Hathaway Steam Trap Company, Safety Bolt and Nut Company, New England Shaver Telephone Company, capital stock \$1,000,000; Aborn Filter Company, Easton and Vernon Machine Company, American Electrical Works, Benham Steam Engine Company.

The extensive alterations being made at the Lowell (Mass.) Machine Shop Foundry will, when completed, make it one of the best arranged foundries in the country. The object is to save the strength of the men employed, and to this end iron is to be carried about the shop by means of overhead cranes with trolley system. Four large pivot cranes are to be removed, which will give much valuable floor space. Iron and coal are to be conveyed to the cupola automatically, and casts, or pouring of the molds, will be made but once a day. This will insure smoother and better castings.

Sigourney Tool Company, Hartford, Conn., are erecting an addition to their machine shop which will be ready about July 1. The extension is 85 x 32 feet, two stories high and built of brick.

Hardware.

Plumb, Burdick & Barnard, Buffalo, N. Y., advise us that they are negotiating for a new site for their factory, but nothing definite in the matter has yet been determined.

The Seneca Falls Mfg. Company, Seneca Falls, N. Y., have recently been reorganized as an incorporated company, with a paid-up capital of \$60,000, for the manufacture of foot and hand power machinery, tools and hardware specialties. The directors of the company are: Adelbert S. Davis, Paul B. Kendig, John Cuddeback, Henry M. Darling and Eugenia Davis. The officers of the company are as follows: President, Adelbert S. Davis; secre-

tary and treasurer, Paul B. Kendig; and superintendent, Henry M. Darding. The company anticipate making some extensions in the business and will commence at once the erection of a large four-story brick building adjoining their present works.

The Goodell Company, Antrim, N. H., are now putting in the foundation for a new brick building, which will be used as their handle shop. It will be 66 feet long and 26 feet wide, two stories high.

The Albany Horse Nail Company have purchased 8 acres of land on Breaker Island, near Albany, N. Y., and will erect a plant for the manufacture of horseshoe nails. The main building will be 250 x 100 feet, built of brick and iron. The nail machines, engines, boilers and other necessary machinery for the works are now being built.

Notwithstanding the general depression in business which has existed for some months, and which has affected the building trades particularly, the business of the Central Expanded Metal Company of Pittsburgh, manufacturers of metallic lathing and fencing is constantly increasing. Their orders for metallic lathing for plastering purposes are received from all parts of the country, and tax their capacity to its utmost in order to keep pace with them. This material, popular from the time of its first introduction, continues to grow in favor with the builders and architects, as shown by this increased sale. Some of the buildings in New York City, recently finished, in which this material has been used are as follows: Stokes Building, 45 to 49 Conder street; Holland House (hotel), Thirtieth street and Fifth avenue; Jewish Synagogue, Seventy-sixth street and Fifth avenue; apartment house, 39 to 41 West Twenty-seventh street; Juvenile Asylum, Twenty-seventh street, west of Sixth avenue; Hotel Renaissance, Forty-third street, west of Fifth avenue; New York Medical College, Forty-third street, west of Fifth avenue; Leake & Watts Orphan Asylum, Yonkers, N. Y.; Providence Hospital Trust Company, Providence, R. I.

The plant of the American Screen Company, Detroit, Mich., was destroyed by fire on the 23d ult. About 100 dozen window screens and considerable wire netting were, however, carried out of the company's warehouse before the flames could reach them. The plant was valued at \$4000 and the material and stock on hand is estimated to have been worth from \$6000 to \$8000. The insurance is slight.

The H. M. Myers Company, Beaver Falls, Pa., advise us that there is a largely increased demand for shovels of good quality in home trade, the company having been pushed to their utmost capacity to supply the wants of their customers. Their output for the past 90 days has been larger than ever before, averaging 5000 dozen per month.

Miscellaneous.

Ground has been broken at Utica, N. Y., for the Utica Gas Fixture Company. The plant will be located on the west side of Hubbell, between Broad and Jay streets. The building will be a two-story one, and its dimensions 30 x 110 feet. A brick boiler house, 26 x 30 feet, will adjoin it. In it will be placed a 20 horsepower boiler and a Payne automatic engine. It is expected that the buildings will be ready for occupancy about July 1.

Among recently organized corporations in Illinois are the Chicago Down Draft Boiler Company, at Chicago; capital stock, \$50,000; for the manufacture of steam boilers and furnaces; incorporators, S. Moody, W. L. Grey and E. S. Griffing. Also the J. L. Perry Machine Company of Chicago; capital stock, \$100,000; for the manufacture of wood-working machinery; incorporators, W. S. Hefferan, J. P. McGoorty and G. W. Kolb.

The Anstead & Higgins Spring Works, at Racine, Wis., have been destroyed by fire, at a loss of \$17,000.

The Weeks Automatic Car Coupling Company have been organized at Roudout, N. Y., with a capital of \$100,000, three-quarters of which has been paid in.

C. A. Lewander of Stockholm, Sweden, announces that he has established himself under the old firm name of Lewander & Co., at Stockholm, as agent and buyer for American manufacturers who consume Swedish iron and steel.

The plant, building and stock of the business in structural and bar iron conducted by the late C. T. G. Chace at 446 West street, New York, are being offered for sale.

Protected Cruiser No. 13.

On the 1st inst. proposals were opened at the Navy Department for the construction of the protected cruiser No. 13, provision for which was made by the last Congress. The vessel will be similar to Cruiser No. 12, equipped with one 8-inch, two 6-inch and a great number of smaller rapid-fire and machine guns. This vessel is designed to make, in an emergency, the extraordinary speed of 22 knots per hour, which would enable her to capture the swiftest of the ocean greyhounds or to escape from the pursuit of any more formidable craft. This high speed is to be obtained through three sets of triple-expansion engines, driving three screw propellers, an arrangement which is also expected to result in more economical cruising at low speeds than is possible with the devices at present in use.

The engines are to be in three separate water-tight compartments, each complete in itself and independent of the others, so that any two might be disabled without interfering with the working of the third.

The collective indicated horse-power of these engines will be about 21,000, and the result of the triple-screw arrangement will be that, with a small number of the boilers working at their most economical pressure, the ship can be driven with one screw at the rate of 15 knots per hour, which would probably be her most economical sea speed. If greater speed is desired, the center screw can be allowed to revolve free in the water, and with two-thirds of the boiler power and the two side screws the vessel will be capable of making 18 or 19 knots per hour. With three screws and all the boilers she will be able to make a sustained sea speed of 21 knots and a maximum speed of over 22 knots per hour. The coal capacity is to be 2000 tons.

All the guns of the main battery of Cruiser No. 13 will be of great length, being what is known as 40-caliber guns—that is, the bore will be 40 times as long as its diameter. This will give the guns high initial velocity, and consequently long range, enabling the vessel to enter into action at a great distance from the enemy. As she is designed primarily to capture the commerce of an enemy and cope only with lightly armed cruisers, her guns will not be of the larger calibers. She will have one 8-inch gun forward, two 6-inch guns aft, and 12 4-inch rapid-fire guns in her main battery. Her secondary battery will include 16 6-pounder rapid-fire, eight 1-pounder rapid-fire, and four machine guns.

The machinery and magazines will be protected by a steel deck, sloping up from below the water line on both sides and flat over the center. This deck will be 4 inches thick on the slopes and 2½ inches thick on the sides, and will be capable of deflecting the fire of any but heavy guns at short range. A coffer dam, 5 feet in width, will be worked next to the side at the water line for the whole length, filled in the central portion with patent fuel that can be used in an emergency, and at the end with water-excluding material. The rapid fire and machine guns will be protected by 4-inch and 2-inch steel plates on the ship's side, while the 6-inch and 8-inch guns will be protected by heavy shields on their carriages.

The bids were: Wm. Cramp & Sons of Philadelphia, \$2,745,000; Union Iron Works of San Francisco, \$2,793,000; Bath Iron Works of Bath, Maine, \$2,690,000. The limit of cost fixed for the cruiser in the act of Congress is \$2,750,000, and the contractor may earn a bonus of \$50,000 for every ¼ knot excess of speed above 21 knots per hour.

This cruiser may be considered as emphasizing the stand taken by the Navy

Department in some of its more recent designs. The search for "precedent" has been abandoned, and a new and advanced field has been entered. So far, success has followed each attempt, and there is no doubt but that Cruiser No. 13 will fully meet the expectations of her designers.

THE WEEK.

The plumbing and ventilating department of the New York Board of Health keeps constantly employed in the inspection of new buildings eight sanitary engineers and seven inspectors proper.

The new Hamburg-American steamship Furst Bismarck beat the east-bound record across the Atlantic to the Scilly Islands, having made the trip to Southampton in 6 days, 13 hours and 25 minutes.

The great artesian well on the Valley stock farm, in South Dakota, has a pressure which forces the water to the height of 120 feet from a 2½ inch nozzle. The well is 960 feet deep and it is estimated that it flows at the rate of 8000 to 10,000 gallons per minute.

Louisiana sugar planters will ask this year for about \$10,000,000 in bounties. The rate is 2 cents a pound and a crop of over 51,000,000 pounds is predicted. An owner of five plantations asks for \$248,800.

The will of the late Charles Pratt, although somewhat involved in its terms, leaves the Pratt Institute with absolute ownership of land, buildings and equipment of the value of \$500,000, and besides that an endowment fund of a round \$2,000,000.

J. Z. Werst, the crop expert, has submitted a report of the crop prospects on winter wheat in Kansas, Missouri, Illinois, Indiana, Ohio and Michigan. This report was made to the managers of several Western railroads interested. Mr. Werst estimates that the States named will produce, provided favorable conditions continue until harvest, 209,891,000 bushels, against 142,177,000 bushels, according to the Government estimate for 1890. Illinois is estimated to produce from 1,982,000 acres 31,712,000 bushels.

Experiments with different explosives are going on at Newport. Good results have been obtained with bellite.

A consignment of the Witherson smokeless powder has arrived at Wilmington, Del., and is being tested by the Government at Springfield. The E. I. Du Pont de Nemours Company are reported to be developing a new invention and to be negotiating for a site near Newport, where works are to be erected for Government purposes.

A proposal to put a prohibitive duty on American pork was defeated by the French Chambers of Deputies, who adopted the following rates: Pork, \$2.40; salted pork, ham and bacon, \$4 maximum and \$3 minimum.

Last week the organization was effected of the American University, a large number of prominent men being the incorporators. An appeal is shortly to be made for \$5,000,000 for the early commencement of the work of the institute.

Interest in the World's Fair is to be aroused by a visit on the part of Thomas M. Weller to the different foreign nations. An effort is to be made to secure the aid of Carl Schurz and ex-Senator Eustis of Louisiana.

The Lake lines have agreed to a tariff on eastbound freight of 60, 52, 40, 30 and 25 cents per hundred for the different classes.

TRADE REPORT.

Chicago.

(By Telegraph.)

Office of The Iron Age, 50 Dearborn street,
CHICAGO, June 3, 1891.

The heavy business of last month has been followed by dullness, which is not altogether pleasing to manufacturers and dealers, who were in hopes that the activity would continue through June at least. Railroad interests are still holding back, managers evidently being unwilling to discount the future, although crop prospects are as bright as ever.

Pig Iron.—Sellers of local brands report a quiet week, as most of the large consumers have now covered their requirements. An effort has been made to advance prices slightly, but the trade has not responded willingly, as the manufacturers are not in accord on this matter. For immediate delivery, however, local coke iron is scarce and commands full prices. There will be no trouble in this respect within a week or two, as the Illinois Steel Company have blown in two furnaces and the Calumet Company will have theirs in about the 15th. The new Iroquois will probably be blown in about July 1. The decision of the Mahoning Valley furnaces to resume operations had a immediate effect on furnacemen here. Bessemer Pig is still available in small quantities at \$17.50, but it is affected by the low price of Lake Superior Charcoal, which is being bought for Bessemer purposes. Charcoal furnacemen are, in the majority of cases, quoting \$18 @ \$18.50, but it is understood that some brands are still available at \$17 @ \$17.50. The demand for Charcoal has abated very considerably, and not much business in that line is expected until the Car-Wheel men come into the field. Southern Coke is quiet but firm. The leading makers appear to have agreed not to reduce prices. In this they are supported by the smallness of stocks, but it remains to be seen how the situation will be affected by the resumption of activity at Northern furnaces. Local foundrymen report their business much better in a general way. The jobbing trade especially is much more active than it has been. New work is very promising, but difficulty is encountered in financing new enterprises, which prevents expansion in anything but strictly legitimate lines. We quote for cash, f.o.b. Chicago:

Lake Superior Charcoal.....	\$17.00 @	\$18.00
Local Coke Foundry, No. 1.....	15.50 @	16.00
Local Coke Foundry, No. 2.....	15.00 @	15.50
Local Coke Foundry, No. 3.....	14.50 @	15.00
Local Scotch.....	16.00 @	16.50
Ohio Strong Softeners.....	18.00 @	18.50
Southern Coke, No. 1.....	16.00 @	16.50
Southern Coke, No. 2.....	15.50 @	15.75
Southern Coke, No. 3.....	14.75 @	15.00
Southern, No. 1, Soft.....	15.25 @	15.50
Southern, No. 2, Soft.....	14.25 @	14.50
Southern Gray Forge.....	14.25 @	14.50
Tennessee Charcoal, No. 1.....	18.00 @	
Alabama Car Wheel.....	22.50 @	23.50
Coke Bessemer.....	17.50 @	18.00
Hocking Valley, No. 1.....	17.00 @	18.50

Bar Iron.—Although in one way and another considerable business has been entered on mill books during the past week, the course of trade is not entirely satisfactory. Inquiries are not so numerous as they were, and the market has been too easily satisfied. It has not broadened, as was expected, but, on the contrary, has contracted. Yet the mills are now comfortably supplied with work for the next month or two, and, therefore, show no disposition to let down prices. The valley makers quote 1.55¢, half extras, at mill, and the local manufacturers 1.67½¢ @ 1.70¢. Jobbers continue former quotations and report an active trade from store.

Structural Iron.—Important building contracts have been placed since our last report, involving the consumption of a great deal of Iron and Steel. Among them are the Grant Locomotive Works and a large cold storage building. During the next two weeks several other large buildings are to be placed under contract, covering a large quantity of Beams and Columns. The Structural mills are well employed now, but are making good deliveries on contracts. Prices are unchanged.

Plates.—Business in Tank Steel appears to have taken precedence of other kinds of Plates. Numerous orders have been sent to the mills from this locality recently, and they now appear to be well supplied with work, as they are asking higher rates, in some cases \$3 ¾ ton. Boiler Plates are quiet and store trade is dull. Prices from stock unchanged.

Sheets.—A few manufacturers have some room for more Black Sheet orders, as low quotations are extant, but leading makers are well supplied with business and ask 2.85¢ @ 2.95¢ at mill for No. 27 common. Jobbers quote same at 3.30¢ in small lots. Galvanized Iron is in considerably better demand from all classes of consumers. Manufacturers' agents have had a heavy trade both out of store and for mill shipment. Prices are still very low. Jobbers quote Juniata 65 % off.

Merchant Steel.—More season contracts have been entered by implement manufacturers, and the general demand has been fair also. Prices are very irregular, the low rates now quoted being made, it is claimed, by sellers of low-grade material. Even Tool Steel is not exempt from this imputation.

Track Supplies.—Only a small tonnage has been entered in Steel Rails, but inquiries are steadily growing larger, covering good sized quantities, and the prospect daily improves for heavy business before long. Manufacturers quote \$31 for round lots, but insist that this is their lowest rate for the very best orders. Iron Splice Bars are selling in a small way at 1.85¢ @ 1.90¢. Spikes are firmer, in consequence of a better demand and scarcity of Old Rails, and while quotations still range from 2¢ to 2.10¢, the quantity available at the lower rate is said to be limited. Track Bolts with Hexagon Nuts are still quoted 2.80¢ @ 2.90¢, but these rates are shaded.

Old Rails and Wheels.—Everything is quiet in this line and quotations are nominal at \$22.75 for Iron Rails, \$14.50 @ \$17 for Steel Rails and \$16.50 @ \$17 for Car Wheels.

Scrap.—The demand is very light, but prices are unchanged. Dealers quote as follows per ton of 2000 pounds: No. 1 Railroad, \$19; No. 1 Forge, \$18.50; No. 1 Mill, \$13.50; Fish Plates, \$21 @ \$21.50; Axles, \$24; Pipes and Flues, \$12.50 @ \$13; Horseshoes, \$18.50; Cast Borings, \$7.50 @ \$8; Wrought Turnings, \$11.50; Axle Turnings, \$13; Machinery Cast, \$12; Stove Plates, \$8.50 @ \$9; Mixed Steel, \$11; Coil Steel, \$15; Leaf, \$16; Tires, \$18.

Metals.—Lake Copper dropped nearly 1¢ the past week, but swung back again and nearly recovered the lost ground. Casting brands have advanced under an active demand. Lake is quoted at 13¢ and casting brands at 12¢ in carload lots. Spelter is strong, with an upward tendency, being now quoted at 4.85¢, with very little stock to be sold. In Pig Lead, Everett & Post report that the week has developed considerably more inquiry, and under a very good consumptive demand values have improved at all the centers. Production and consumption have been about equal, yet it seems to be the policy

of at least one refiner to accumulate stock; but outside this source there is no accumulation of Lead except in New York, where some 2000 tons are reported held by a local concern. The position of the metal is a firm one, and with a large trade in June, which now seems assured (unless manipulation is brought to bear), we look for higher prices. At Chicago trade has shown considerable improvement, and during the week some 700 tons Missouri and Desilverized sold at 4.15¢, 4.20¢ and 4.25¢. At the close values are strong, 4.20¢ bid, 4.25¢ asked. The average price of Lead in the market for May was 4½¢, against 4.10¢ for last year.

L. S. Boomer & Co., agents for the Carbon Iron Company of Pittsburgh and other manufacturers of Iron and Steel, have opened an office in the Rookery Building, Chicago. The Carbon Iron Company will make Steel Boiler Plate for the Western trade at Springfield, Ill., in the mill recently leased from the Springfield Iron Company.

The Coatesville Rolling Mill Company of Coatesville, Pa., have opened a branch office for the sale of Iron and Steel Plates and Sheets in Jones & Laughlins' building, Lake and Canal streets, Chicago, with Mason G. Worth as general sales agent in charge.

The Iroquois Furnace Company, Rookery Building, Chicago, have made arrangements for the sale of a portion of their product through Charles Himrod & Co. and another portion through W. W. Backman, also in the Rookery Building. They have also engaged the services of William Todd as salesman, who will be directly connected with their own office. In addition to making a special quality of high class Foundry Iron, the company propose to put on the market a grade of Soft Strong Iron under the brand of Sterling Scotch.

Forsyth, Hyde & Co., Dearborn and Randolph streets, Chicago, have been reappointed agents for the sale of Tuscarawas Pig Iron, which is a Blackband Iron made by the Penn Iron and Coal Company of Canal Dover, Ohio.

Sanderson Bros. Steel Company of Syracuse, N. Y., have established a branch warehouse in Chicago at Nos. 11 and 13 South Jefferson street, which will be under the management of Archibald Winne, well and favorably known throughout the entire West. A complete and well assorted stock will be carried of the company's Tool Steels, best cast, extra and self-hardening. They make a specialty of Crucible Steels.

Philadelphia.

Office of The Iron Age, 220 South Fourth St.,
PHILADELPHIA, Pa., June 2, 1891.

It is a difficult matter to define the exact position of the Iron market, unless by saying that there is very little change from several weeks preceding. This is true as far as it goes, but it does not cover the entire subject, and is, therefore, not altogether satisfactory. As a matter of fact, prices to date are neither better nor worse than they have been for a month or six weeks past. The outlook, however, is distinctly better and the chances are strongly in favor of some little advance on pretty nearly everything on the list. Mills have more orders on their books than they have had for quite a long time past, and as there is a vast amount of work coming close in sight, there is a tendency to ask more money for all kinds of finished Iron and Steel and to some extent on Pig Iron as well. Of course no one expects very much of an advance; the capacity for production is so great and there are so many on the lookout for new business that it

will take an enormous quantity to give each one a taste, but even that seems to be almost within reach. It is now pretty well assured that upward of 45,000 tons of finished material will be contracted for inside of 30 days for the New York elevated railways, and as other interests are beginning to place orders more freely, the general position is immensely improved. Of course we remember the old adage of "many a slip," but in this instance, providing nothing unforeseen occurs, there is every reason to expect that the order will go through, and that deliveries will commence inside of 60 days. This being settled, it goes without saying that the fall trade will be one of great activity, and as a consequence, prices will be more remunerative than they have been during the earlier portion of the year. The uncertain, if not the actually, weak spot seems to be around Pittsburgh, but if there is to be the general improvement that every one expects, it will soon permeate the entire trade of the country, so that there need be no fears in regard to markets at a distance, although in the meantime prices have to be kept in proportion to those ruling at other points.

Pig Iron.—The market has been very steady of late, and without material deviation from prices quoted for several weeks past. The present tendency, however, is toward increased firmness, and in some cases trifling advances are obtained, especially on favorite brands. Another strong feature is the scarcity of low-priced material, which is generally a good indication of an advancing market. In fact, at quoted rates, there are no evidences of oversupply in any direction, and such a thing as a concession is hardly taken into serious consideration at present. Sales have been on quite a liberal scale during the past week, not especially heavy in any one direction, but the demand is of a well-distributed character, taking in pretty much all classes of consumers. Prices average a little higher, without being notably dearer, although some are beginning to name \$18.25 @ \$18.50 for their best Foundry Irons. A similar tendency may be noted in Mill Irons, so that it may be safely asserted that the market is firmer, and that prices are improving. Quotations for lots delivered are about as follows, varying according to brand, point of delivery, &c.:

Ohio Softeners, No. 1x.....	\$19.00 @ \$19.50
Ohio Softeners, No. 2x.....	18.00 @ 18.50
Standard Penna., No. 1x.....	17.75 @ 18.00
Standard Penna., No. 2x.....	16.50 @ 17.00
Medium Penna., No. 1x.....	17.25 @ 17.50
Medium Penna., No. 2x.....	16.00 @ 16.25
Virginia, No. 1x.....	16.75 @ 17.50
Virginia, No. 2x.....	15.75 @ 16.00
Standard Neutral All-Ore Forge	14.75 @ 15.25
Ordinary Forge Cinder mixed..	14.00 @ 14.25
Hot Blast Charcoal.....	20.00 @ 22.00
Cold Blast Charcoal.....	24.00 @ 27.00

Bessemer Pig.—The most profound apathy prevails in regard to new business. Nominal prices are \$17 @ \$17.50, at furnace, for standard brands, and \$19 @ \$20 for low phosphorus, say 0.03 and less.

Ferromanganese.—Small lots are taken at about \$64.50, duty paid, for 80 %, asking prices usually about \$65.

Steel Billets.—Several good-sized lots have been taken for near-by delivery, but lower prices were accepted than seemed probable a week ago. In one instance \$28 was paid for 4 x 4s, at mill near by, and in another it is understood that the price was a shade lower, and in still another, a little over \$28 was the figure. Sellers are talking higher prices, but when it comes to actual business, it appears that buyers come out ahead. Asking prices are about \$27.50 @ \$27.75 for deliveries on the Susquehanna, or \$28 @ \$28.25 for seaboard or Schuylkill Valley; market irregular, but at these figures the market is not weak.

Steel Rails.—Market a shade better. There is more business around, and buyers are beginning to realize that \$30 at mills

is a rock bottom quotation. Sales all at that figure, or a little higher for some deliveries.

Muck Bars.—Market dull, but firm at \$26.75 @ \$27, delivered. Regular sizes of guaranteed quality are not to be had for less than \$27, but 5 and 6 inch Bars could be had to-day at \$26.75—perhaps a little less for lots on which holders are anxious to realize.

Bar Iron.—Some improvement may be reported again this week. There is no special urgency in the demand, and no material change in prices; but the tendency is toward improvement, so that the feeling may be defined as better, both as regards price and demand. Low-priced stuff is less abundant, and it does seem as though \$1.75 at city mills was pretty near bottom for good Iron, although at country mills \$1.60 @ \$1.65, f.o.b. cars, are not unusual quotations for 100-ton lots and upward.

Skelp Iron.—The demand is not likely to amount to much for some time to come, although small sales are made at \$1.70 @ \$1.75, delivered, for Grooved, and \$1.85 @ \$1.95 for Sheared, but there is very little inquiry for large lots.

Plates.—The market is gradually firming up, and as mills are getting quite a large amount of orders on their books, the chances are favorable for higher quotations in the near future. At the same time we must note the fact that in some cases very low prices have been quoted during the past few days, and that while the general tendency is toward improvement, there are weak spots to be found once in awhile. These, however, will doubtless soon be filled up, after which we may expect a general movement toward better figures along the entire line. The usual asking prices (delivered) are about as follows, although, as we have stated, weak spots are not all wiped out:

	Iron.	Steel.
Tank Plates.....	2.00 @ 2.10¢	2.05 @ 2.20¢
Refined.....	2.20 @ 2.30¢	2.05 @ 2.10¢
Shell.....	2.30 @ 2.40¢	2.40 @ 2.50¢
Flange.....	3.20 @ 3.30¢	2.50 @ 2.75¢
Fire-Box.....	4.00 @ 4.25¢	3.00 @ 3.50¢

Structural Material.—The contract mentioned at the beginning of this article is the most absorbing feature of the week, and although some well-informed people profess to have strong doubts on the subject, we have the best of reasons for believing that the orders are virtually on the market to-day, and that as a matter of fact, about 15,000 tons are already arranged for. Of course there may be delays in getting out the specifications, but we are not in the habit of reporting contracts unless they are properly vouched for, as we believe they are in this instance. Meanwhile prices are a little firmer, but in a general way quotations (delivered) are about as follows: Angles, 2.05¢ @ 2.10¢; Sheared Plates, 2¢ @ 2.10¢, and 10¢ @ 15¢ more for Steel, according to requirements. Tees, 2.5¢ @ 2.6¢; Beams and Channels, 3.1¢ for either Iron or Steel.

Sheet Iron.—The market is irregular, but on the whole it shows increasing activity. Some of the mills report quite a liberal amount of business during the past ten days, although prices are irregular and in some cases very weak. Best makes are quoted about as follows:

Best Refined, Nos. 14 to 20.....	3.00¢ @ 3.10¢
Best Refined, Nos. 21 to 24.....	3.10¢ @ 3.20¢
Best Refined, Nos. 25 to 26.....	3.20¢ @ 3.30¢
Best Refined, No. 27.....	3.40¢ @ 3.50¢
Best Refined, No. 28.....	3.50¢ @ 3.60¢
Common, $\frac{1}{2}$ ¢ less than the above.	
Best Soft Steel, Nos. 14 to 20.....	3¢ @ 3 $\frac{1}{2}$ ¢
Best Soft Steel, Nos. 21 to 24.....	3 $\frac{1}{2}$ ¢ @ 4¢
Best Soft Steel, Nos. 25 to 26.....	4¢ @ 4 $\frac{1}{2}$ ¢
Best Soft Steel, Nos. 27 to 28.....	4 $\frac{1}{2}$ ¢ @ 5¢
Best Bloom Sheets, $\frac{1}{2}$ ¢ extra over the above prices.	
Best Bloom, Galvanized, discount.....	@ 67 $\frac{1}{2}$ ¢
Common, discount.....	@ 70 ¢

Old Rails.—Business is extremely flat, and only very small lots are taken at \$22 @ \$23 for Iron, or \$17.50 @ \$18.50 for Steel, price according to point of delivery.

Scrap Iron.—The market is extremely dull, but as holders are not forcing sales, quotations are fairly maintained as follows: No. 1 Railroad Scrap, \$21 @ \$21.50, Philadelphia, or for deliveries at mills in the interior \$21.50 @ \$22, according to distance and quality; \$15 @ \$16 for No. 2 Light; \$14 @ \$15 for best Machinery Scrap; \$13 @ \$14 for ordinary; \$15 @ \$16 for Wrought Turnings; \$10 @ \$10.50 for Cast Borings, and nominally \$24 @ \$25 for Old Fish Plates, and \$16 @ \$17, delivered, for Old Car Wheels.

Wrought-Iron Pipe.—The demand is improving and prices are steadier, although cuts are still made to secure desirable orders. Nominal discounts about as follows:

Butt-Welded Black.....	55 %
Butt-Welded Galvanized.....	45 %
Lap-Welded Black.....	65 %
Lap-Welded Galvanized.....	52 $\frac{1}{2}$ %
Roller Tubes, 2 $\frac{1}{2}$ inch and under.....	55 %
Boiler Tubes, 2 $\frac{1}{2}$ inch and larger.....	60 %

The firm of Thos. W. Simpers & Co. has been succeeded by Simpers, Collins & Co., who will hereafter carry on the business under that firm name. John H. Collins, formerly connected with Wm. M. Whitaker, Iron and Steel merchants, of Philadelphia, being the new member of the firm.

Louisville.

LOUISVILLE, KY., June 1, 1891.

Pig Iron.—The Pig Iron situation is devoid of any new features. The inquiry continues fair and pretty well distributed over different sections. Many buyers, realizing that prices have touched bottom, have supplied themselves for several months to come, while others continue to purchase small amounts, believing that while prices may be low there is small chance of an immediate advance, and are willing to take their chances of picking up odd lots at prices a little under line. Furnaces are beginning to feel that it is time they should do something to better the situation if it is possible, and an effort is being made to bring about an established basis of prices from which none will recede, and as this sentiment seems to prevail pretty generally it is believed that the movement will be fairly successful. No. 1 and No. 2 Foundry are reported scarce. The price is nominally \$10.25 for Gray Forge, Birmingham, though Iron can be bought at \$10, and a round lot of No. 2 Soft has just been placed by one of the leading companies basis of \$10.25, Birmingham, though recently contracts were taken as low as \$10, Birmingham. We quote for cash, f.o.b. cars Louisville:

Southern Coke, No. 1 Foundry...	\$14.50 @ \$15.00
Southern Coke, No. 2 Foundry...	13.75 @ 14.25
Southern Coke, No. 3 Foundry...	13.25 @ 13.75
Southern Coke, Gray Forge.....	12.75 @ 13.25
Southern Charcoal, No. 1 Foundry	16.00 @ 17.00
Southern Car-Wheel, standard brands.....	17.00 @ 20.00

Cincinnati.

(By Telegraph.)

Office of The Iron Age, Fourth and Main Sts., CINCINNATI, June 3, 1891.

Pig Iron.—There has been a tamer feeling in the market during the week, with less disposition on the part of buyers to contract for long forward delivery, and more willingness on the part of the furnaces to sell. Not that there is any letting down of the price of Southern Gray Forge, the ruling rate for which is \$10 ton at the furnace, for either short or long forward delivery, but No. 1 and No. 2 Foundry are more freely offered, and at

commissions of 25¢. There has been a pretty liberal distribution of these Irons, but not in any large way. Standard Southern Charcoal Irons are well sustained in price, but there are still some mongrel Irons of this class that are for sale at lower rates, and the transactions in all kinds have been on a moderate scale. There is a prevailing sentiment that the settlement of the strike in the Connellsville Coke region means a larger production of Iron from Lake Superior Ore, which has been and can be secured at a material reduction in price from last year, and that this will greatly interfere with the marketing of Southern Irons; and, although this may not occur in the immediate future, there is no doubt that its influence is already felt and leads to more urgent offerings of the latter. As yet there are few indications of an enlargement in consumption. The repair shops may be doing a little more, but not enough to tell in the Iron market. Pipe works are laying low, feeling that there is no occasion for anticipating their necessities. Fine rains have fallen in the country tributary to this market and improved the agricultural outlook, which may have a salutary effect upon the Iron market later in the season, but at the moment there is not much encouragement to look for a revival of business.

Foundry.		
Southern Coke, No. 1.....	\$14.75 @	\$15.00
Southern Coke, No. 2.....	13.75 @	14 00
Southern Coke, No. 3.....	13.25 @	13 50
Ohio Soft Stone Coal, No. 1.....	16.50 @	17 00
Ohio Soft Stone Coal, No. 2.....	15.50 @	16 50
Mahoning and Shenango Valley.....	17.50 @	18 00
Hanging Rock Charcoal, No. 1.....	20.00 @	22 00
Hanging Rock Charcoal, No. 2.....	19.00 @	20 00
Tennessee and Alabama Charcoal, No. 1.....	17 00 @	17 50
Tennessee and Alabama Charcoal, No. 2.....	16 50 @	17 00
Forge.		
Gray Forge.....	12.75 @	13 00
Mottled Neutral Coke.....	12.50 @	12 75
Car Wheel and Malleable Irons.		
Southern Car Wheel.....	19.50 @	20 75
Hanging Rock, Cold Blast.....	20.00 @	21 00
Lake Superior Car Wheel and Malleable.....	19.00 @	20 00

Pittsburgh.

Office of The Iron Age, Hamilton Building }
PITTSBURGH, June 2, 1891.

The situation as regards the general Iron and Steel trade is much the same as a week ago, with the exception that there is a better feeling in consequence of the more reassuring character of the crop reports. The great Coke strike, after a contest of almost four months, is a thing of the past, the strikers being glad now to resume work on the terms of the operators.

Pig Iron.—There was a fair degree of activity the past week, but no important change in prices. Nearly all the Bessemer Iron available for immediate or near-by delivery has passed into the hands of consumers, and some sales have been made for delivery monthly during the rest of the present year. The demand for Mill Iron has been rather better the past week both here and out in the Shenango and Mahoning valleys. Several good-sized sales were reported by city furnaces at \$14 cash, delivered, and by valley furnacemen at \$13.75, delivered to valley consumers. Now that the Coke strikes are over, some of the valley furnaces have been started up, and reports from there say that others will soon follow, notwithstanding it was claimed that they would not do so until they got cheaper Coke. Standard brands of Foundry Iron are becoming scarce and are held more firmly, but the demand is not particularly urgent, and is chiefly for small lots. We quote as follows:

Neutral Gray Forge.....	\$14.00 @	\$14.25, cash
White and Mottled.....	13.50 @	13.75, "
All-Ore Mill Iron.....	14.75 @	15.25, "
No. 1 Foundry.....	16.50 @	17.00, "
No. 2 Foundry.....	15.00 @	15.50, "
No. 3 Foundry.....	14.50 @	14.75, "
No. 3 All-Ore Foundry.....	16.25 @	16.50, "
Cold-Blast Charcoal.....	25.00 @	27.00, "
No. 2 Charcoal Foundry.....	21.50 @	22.00, "
Bessemer Iron.....	15.75 @	16.00, "

Advices from Cleveland report that a good many contracts have been made for Ores, both Bessemer and non-Bessemer, largely on Pittsburgh account, at prices from \$1 to \$1.50 per ton below those of a year ago. It is reported that Bessemer Ores have been pretty well bought up.

Muck Bar.—The demand continues light, while prices remain unchanged. Most of the business reported is at \$26.25 @ \$26.50. Buyers do not want to pay over \$26, but there are very few sellers at that price. A good many of the mills making a specialty of Muck are pretty well sold up, and they are looking for a better demand as the season advances.

Ferromanganese.—Small sales of domestic 80 % at \$66.50, which has been the ruling price. There have been very few sales of foreign in this market for some time past, as it cannot be laid down here at the price quoted for domestic.

Manufactured Iron.—There has been no important change in the situation during the past week. Business is far from satisfactory to manufacturers, either in regard to demand or prices. While the crop prospect is more reassuring, labor troubles continue, and while it is expected that trade later on in the season will improve, orders are not coming forward as freely as they should at this time. The Amalgamated Association, as it was intimated in this report some time ago it would, has agreed to renew the present wage scale on July 1, so that there will be no trouble unless the manufacturers should demand a reduction, which is not probable. Prices remain as quoted a week ago: Bars 1.70¢ @ 1.75¢; Plate and Tank 2.10¢ @ 2.15¢; No. 24 Sheet, 2.75¢ @ 2.80¢, full extras, 60 days, 2 % off for cash; Skelp Iron 1.62½¢ @ 1.67½¢ for Grooved, and Sheared 1.80¢ @ 1.85¢. The mills out in the Shenango and Mahoning valleys are reported as being pretty well filled up, and that prices there are stiffer in consequence.

Nails.—The Cut Nail trade is still reported in an unsatisfactory condition, particularly in regard to prices, which afford little or no margin for profit. We continue to quote at \$1.55 @ \$1.60, 30 to 35 average, 60 days, 2 % off for cash. The Wire-Nail trade continues in a very unsatisfactory condition; like the Cut-Nail trade, it appears to have been overdone. The report which was made in our last that sales have been as low as \$1.90, delivered at Chicago, is hardly credited, and manufacturers are asking \$2 and some of them are refusing to sell for any less, claiming that even at the price quoted there is little or no margin for profit.

Structural Material.—There is rather more inquiry, but there is nothing like the business there should be at this season of the year, and it is attributed largely to labor troubles, which are holding work back, and will cause a good many contemplated improvements to either be abandoned or go over until next year. Prices remain unchanged: Channels and Beams, 3.10¢; Angles, 2¢; Steel-Sheared Bridge Plate, 2.10¢ @ 2.15¢; Universal Mill Plates, Iron, 2.10¢; Tees, 2.65¢; Refined Bars, 1.80¢ @ 1.90¢.

Steel Plate.—While there has not been much new business placed here of late, the mills are busy working up old contracts. Prices remain unchanged. Tank, 2.10¢; Shell, 2.45¢; Flange, 2.70¢; Fire Box, 3.90¢ @ 4.25¢.

Merchant Steel.—There is nothing new to report; business continues light, while prices remain unchanged: Bessemer Tool Steel, 7¢ @ 7½¢; do., Spring, 2½¢; do., Machinery, 2.40¢ @ 2.50¢; Toe Calk, 2½¢; Steel Tire, 2.20¢; Steel Bars, 1.90¢, full extras; Crucible Spring Steel, 4¢; Crucible Machinery, 5¢.

Barb Wire.—The syndicate prices remain unchanged, but some jobbers are still underselling the syndicate, and they getting the most of the new business. We repeat syndicate prices: Glidden Painted, \$2.85; do. Galvanized, \$3.40; Four-Point Painted, \$2.80; do. Galvanized, \$3.30, f.o.b. at factory. Jobbers generally, it is said, bought largely before the syndicate was organized, and this accounts for their being able to undersell the syndicate.

Steel Billets.—There has been but comparatively little new business reported, and while the feeling possibly is not as strong as it was a week ago, prices remain unchanged at \$25.50 @ \$26. Manufacturers are refusing to sell below \$25.50, and they cannot get more than \$26. The mills both here and at Wheeling are pretty well sold up, and then the fact that the mill of Carnegie, Phipps & Co. at Duquesne (formerly the Allegheny Bessemer) has taken off Billets and put on Rails has not been without its effect on the market for Billets.

Old Rails.—Old Iron Rails continue neglected, and there is hardly enough doing to establish prices; however, the supply is small and growing less and less. We quote nominally at \$23 @ \$23.50. There is continued inquiry for Old Steel Rails, and we continue to quote at \$17.50 @ \$18 for long and short pieces.

Wire Rods.—Continue very quiet, and in the absence of sales may be quoted nominally at \$37, cash, at mill.

Wrought-Iron Pipe.—Business in this important branch of the Iron industry continues unsatisfactory to manufacturers; not only are prices very low and unremunerative, but the demand is light for the season of the year. The syndicate prices remain unchanged, as follows: Discount on Black Butt Pipe, 55 %; on Galvanized do., 45 %; on Black Lap Weld, 65 %; on Galvanized do., 52½ %; Boiler Tubes, 2½-inch and smaller, 55 %; 2½-inch and larger, 60 %; Casing, all sizes, 55 %. The regular monthly meeting of the Manufacturers' Association takes place in this city tomorrow (Wednesday) and it is expected that prices will be advanced.

Railway Track Supplies.—Business fair, but not equal to what it was at this time last year. Prices remain unchanged. Spikes, \$2.05; Splice Bars, \$1.80 to \$1.90; Track Bolts at 2.75¢ with Square and 2.85¢ with Hexagon Nuts.

Steel Rails.—The market here is reported steady at \$30, f.o.b. at mill. The mill at Duquesne (formerly the Allegheny Bessemer), which has been working on Billets ever since passing into the control of Carnegie Brothers & Co., has been started upon Rails, so that we now have two mills there working on Rails.

Old Material.—The demand for all kinds of Old Material continues light, and prices are weak, but without quotable change. No. 1 Wrought Scrap at \$19 @ \$19.50 per net ton; Iron Axles, \$26 @ \$27; Cast Scrap, \$14, gross; Old Car Wheels, \$16.50 @ \$17; Steel Bloom and Rail Ends, \$17.50 @ \$18.

Connellsville Coke.—The strike is over, and Coke operators are again in condition to meet all demands made upon them for Coke. Prices are quoted as follows: Blast Furnace Coke, \$1.90; Foundry Coke, \$2.30; Crushed Coke, \$2.65, f.o.b. at ovens, all per ton of 2000 lb.

(By Telegraph.)

It is said that there are very few sellers of Steel Blooms for this month, mills all being sold up. A sale of 1000 tons reported at \$25.35, on cars at Wheeling. It is rumored that a large consumer here

bought 10,000 tons, but as yet it has not been verified. The Wire Nail manufacturers held a meeting here yesterday, but it is understood took no action in regard to prices. The report that Nails had been sold at \$1.90, delivered in Chicago, is denied. The Wrought Iron Pipe Association met here to-day and reaffirmed former prices, with the exception of Boiler Tubes, which were advanced as follows: Up to 2½ inches inclusive, 55 % off; from 3 inches up to 6 inches inclusive, 65 % off; from 7 inches and upward, 55 % off list.

St. Louis.

OFFICE OF *The Iron Age*, 214 N. Sixth st.,
St. Louis, June 1, 1891.

Pig Iron.—Buying continues in a limited way, as consumers have not become convinced that an early improvement in values is probable, and it is reasonable to assume that they are correct. The Coke strike is ended, and, while all the furnaces which blew out on account of their inability to keep full supplies of Coke on hand cannot start up immediately, it is quite probable that a fair percentage of these idle furnaces will soon be heard from; in fact some have already commenced operations, and others are getting things in shape to follow. This increase in production comes at a time when the market is least prepared to weather it, and unless there is an increased demand for some source which is not now taken into consideration a lower range of prices will doubtless prevail. It is questionable, however, if lower prices will rule for any length of time for various reasons. First and prominent is the crop question. The outlook is considered brighter for large crops of wheat and corn than the West has known for years. Railroads are preparing for it by renovating old freight cars which it was thought were long past their days of usefulness. Dealers in supplies of various kinds are buying largely in anticipation of a heavy fall trade, and the hundreds of other industries which are intimately associated with the crop question are all working with the same general end in view. With these facts before them furnacemen are more than justified in anticipating an early improvement in Pig Iron. Consumers, however, who have in the last few years fallen into the habit of buying only as their requirements demand, are likely to be caught with light stocks on one hand, and a rising market on the other. The week under review, as stated above, resulted in purchases of moderate quantities at current rates, and the general situation does not show much change from last week. We quote as follows for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry.	\$15.75 @ \$16.00
Southern Coke, No. 2 Foundry.	14.75 @ 15.00
Southern Coke, No. 3 Foundry.	14.00 @ 14.25
Gray Forge.	13.50 @ 13.75
Southern Charcoal, No. 1 Foundry.	17.50 @ 18.00
Southern Charcoal, No. 2 Foundry.	17.00 @ 17.50
Missouri Charcoal, No. 1 Foundry.	15.50 @ 16.00
Missouri Charcoal, No. 2 Foundry.	15.00 @ 15.50
Ohio Softeners.	18.25 @ 19.50

Bar Iron.—Trade continues to show a steady increase, and mills are fairly well supplied with orders. Railroads are buying some quantities of iron, but as yet no orders of any consequence have been placed. Lots from mill are quoted at 1.70¢ @ 1.75¢, delivered on cars at East St. Louis. Small lots from store command 1.82½¢ @ 1.87½¢.

Barb Wire.—The improvement in the demand noted in our last report continues. Prices are reported to have been shaded

in some directions, but mills claim they are selling at the recent advance. We quote as follows: Painted, 2.95¢; Galvanized, 3.50¢; carload lots 10¢ per cwt. less than above prices.

Wire Nails.—The situation is improving somewhat. Mills who had large stocks on hand have cleaned out their warehouses pretty thoroughly, and low priced Nails are not now to be had. We quote as follows: Carload lots from mill command \$2.10 @ \$2.15, f.o.b. cars St. Louis.

During the recent convention of the American Boiler Manufacturers' Association, which was held here, the question came up whether it was possible to obtain 60,000 Bloom Flange Iron for Boiler Plates. The Ewald Iron Company of this city advise us that they have been making this grade of Iron since 1844 and are in a position to quote on any quantity needed.

(By Telegraph.)

The demand for Pig Lead shows some improvement since our last report. A sale of 500 tons yesterday in New York has stimulated trade in this market to some extent, and 4.20¢ is now quoted, with light offerings. The market is firm and a further advance in price is considered probable. There is no scarcity of Spelter, as consumers are buying only in quantities to meet their actual requirements. Furnaces are running steady and warehouses are receiving a considerable portion of their output. The market is firm at 4.60¢ @ 4.65¢ for early deliveries, while future shipments do not command any advance over these prices.

Cleveland.

CLEVELAND, June 1, 1891.

Iron Ore.—The local papers seem to have just discovered the big sales of Ore that were reported exclusively in *The Iron Age* several weeks ago. There have been several additional transactions during the past week or ten days, but at almost precisely the same figures given as when the market first opened. *The Iron Age* then announced sales of No. 1 Ore from the Chapin Mine at \$5.50—the same figures reported for a liberal sale last week. It was also recorded at that time that the Norrie's prospective output had been practically all disposed of at \$4.50; that other Gogebic Bessemer were selling for \$4.25 @ \$4.50; Republic Ore at \$5.50, and non-Bessemer Menominees at about \$3.50 @ \$3.75. These have been the quotations prevailing during the temporary flutter in the market of the past few days. The fight over vessel rates has gone on until the freight from Escanaba to Cleveland has been brought down to 55¢ per ton, while engagements from Ashland and Two Harbors are believed to have been made at 90¢—figures that certainly mean no profit to the vessel owners. The strike of the Ore handlers continues. The men have been offered 1¢ more per ton than is paid at other lake ports, but ask for 3¢ additional. If the strike continues Cleveland will get but a meager portion of the Ore output of 1891, as it matters little to the purchasers through what particular port their Ore is shipped. Shipments to the furnaces all insignificant, and the amount of old Ore on the docks is still considerably more than 2,000,000 tons. Quotations are as follows:

No. 1 Specular and Magnetic Ores, Bessemer quality.	\$5.25 @ \$5.50
No. 1 Specular and Magnetic Ores, non-Bessemer quality.	4.25 @ 4.50

Gogebic Ore, Bessemer quality.	4.25 @ 4.50
Menominee Ore, Bessemer quality.	4.25 @ 4.50
Menominee Ore, non-Bessemer quality.	3.40 @ 3.60

Many dealers believe that they can discern indications of a good foundry trade for the near future in the fact that most of the Ore sold during the past four days—estimated at 500,000 tons—has been of the lower grade. Another fallacy into which the local papers have fallen is their presumption that the sales thus far have been from the stocks of unsold Ore on the docks. This is erroneous. The sales reported in *The Iron Age* are of new Ore exclusively.

Later.—The Ore market has opened this week quite actively. Big sales are reported. The Carnegies seem to have bought all the Ore they will need this year. These purchases are estimated to amount to 600,000 or 650,000 tons. The firm carried over from last year a considerable amount, their usual early spring purchases aggregating from 1,000,000 to 1,250,000 tons. The sales made to this firm last week include a large block of Norrie Ore at prices believed to be very close to \$4.50, Cleveland; large amounts from the Minnesota, Pewabic, Carey and Chapin mines, and smaller amounts from other mines.

Pig Iron.—The market is rather dull and prices are not very firm. The outcome of the long controversy over Coke and freight rates is discouraging, and very little new business is reported. A few of the furnaces may start up, but the revival will not be general by any means. Some sales of Foundry Irons are reported at private terms. There have been many inquiries for Bessemer, but apparently very few sales.

Manufactured Iron.—The mills seem fairly well supplied, and dealers report good business at 1.60¢ @ 1.65¢ for Common Bar.

Old Rails.—Prices are a little lower, one or two sales being reported at \$23. This price would probably be shaded a little for a large order.

Scrap.—The market is rather quiet. No. 1 Railroad Wrought selling for \$19.50 and Old Wheels for \$16.50.

(By Telegraph.)

Exhaustive inquiries among the big Ore dealers show that the Carnegies' purchases of new Ore equal, if indeed they do not exceed, 1,100,000 tons, an amount 400,000 tons in excess of some early estimates of the amount that would be taken. The total sales to date, from the Minnesota mines and from Chandler are 1,250,000 tons, and it is believed that 600,000 tons of this amount have gone to the Carnegies at \$5.50. Sales from Norrie at figures approximating \$4.50, f.o.b. cars Cleveland, probably aggregate 150,000 tons or more. The output of the Pabst Mine has nearly all gone to the same buyers; about 15,000 tons from the Fisk Mine left on the docks from last season was also taken; the Carnegies bought freely of early Ore and have taken a good block of high-grade non-Bessemer at \$3.75 @ \$4.25, f.o.b. cars at lower lake ports. During the past five days the sales of new Ore have aggregated not less than 1,000,000 tons, bringing the total sales to date up to 2,500,000 tons. The strike of the Ore handlers is more determined than ever, and trouble is anticipated to-day, and many vessels are lying in the harbor unable to discharge their cargo.

Detroit.

WILLIAM F. JARVIS & Co., Detroit, Mich., under date June 1, say: "The slightly better outlook mentioned in our last has been realized to a certain extent, both in quantity of sales and also in figures, though the variation in the latter has been very small. Southern Coke Irons are selling much more freely all through Michigan, and two or three good sized contracts were made with our larger buyers in Detroit. The settlement of the Coke strike has had no appreciable effect on the quotations of either Northern or Southern Irons, although a sale of Bessemer (1000 tons) was made to-day at a trifle under \$17, cash, here, where a week ago no one was willing to book orders. Lake Superior Charcoal is moving actively in all directions, the buyers who have not already covered realizing that the present range of prices cannot last very much longer. The largest tonnage of the week came from malleable men in the East. In all branches of Iron business, locally, the report of general steady improvement is heard. Quotations remain unaltered, as follows:

Lake Superior Charcoal, all numbers.....	\$18.00 @ \$18.50
Lake Superior Coke, Bessemer.....	18.00 @ 18.50
Ohio Blackband (40 per cent.).....	18.00 @ 18.50
Lake Superior Coke Foundry, all ore.....	18.00 @ 18.50
Southern No. 1.....	16.25 @ 16.50
Southern Gray Forge.....	14.00 @ 14.50
Jackson County (Ohio) Silvery.....	18.25 @ 18.75

New York.

Office of *The Iron Age*, 96-102 Reade street, NEW YORK, June 3, 1891.

American Pig.—Dealers generally report the market very quiet and seem content to wait for the time when, usually, purchases are made for summer and fall delivery. Northern brands are quoted \$16.75 @ \$18 for No. 1, \$16 @ \$16.50 for No. 2, and \$14 @ \$14.50 for Gray Forge. Southern Iron sells at \$16.50 @ \$17.25 for No. 1, \$15.50 @ \$16.25 for No. 2, \$16 @ \$16.50 for No. 1 Soft, and \$14 @ \$14.50 for Gray Forge.

Spiegeleisen and Ferromanganese.—The market is lifeless, Spiegeleisen continuing at \$28 @ \$28.50 for jobbing lots and no demand for larger parcels. Ferromanganese is firmer and may now be quoted at \$64 @ \$65.

Billets and Rods.—Two Eastern Wire Mills have purchased an aggregate of 3000 tons of Basic Billets made at Chattanooga, Tenn., at private terms. It is reported that the price realized was better than that obtained for the same material for Chicago delivery. We continue to quote \$27 @ \$28.50 at sellers' mill; with Wire Rods unchanged at \$38 at tidewater.

Steel Rails.—The event of the week has been the purchase by the Huntingtons of 40,000 tons from an Eastern Rail Mill, for delivery into next year, at private terms. The market remains firm at \$30.75 @ \$31 at tidewater.

Rail Fastenings.—We continue to quote Fish Plates 1.70¢ @ 1.75¢; Bolts, 2.60¢ @ 2.65¢, and Spikes \$1.90 @ \$1.95, delivered.

Manufactured Iron and Steel.—Breaks in the ranks of the striking Iron workers in this city have led to the ordering forward of some Structural Material. No contracts of any magnitude are recorded. There is a fair amount of business coming up, but prices on Structural Material and Plates continue low and unsatisfactory. We quote Angles, 1.95¢ @ 2.10¢; Sheared Plates, 1.95¢ @ 2.25¢; Tees, 2.45¢ @ 2.75¢, and Beams and Channels, 3.1¢, on dock. Steel Plates are 2¢ @ 2.15¢

for Tank, 2.3¢ @ 2.6¢ for Shell, and 2.5¢ @ 2.7¢ for Flange, on dock. Bars are 1.7¢ @ 1.9¢, on dock.

Vought & Williams have removed from 193 and 194 West street to 363, 365 and 367 Greenwich street.

Financial.

The summer months open with an improved money market, all centers of trade being tolerably easy at about the ordinary rates, and bankers are of the opinion that the drain of gold from this side of the Atlantic has nearly ceased. It is noticed, however, that the Treasury reserves have suffered nearly to the extent that gold has been exported, partly by the surrender of gold certificates. The fact that shipments continue, despite the recent heavy accumulations in the banks of Europe, and notwithstanding the reduced premiums offered for gold by the Bank of England, excites a degree of anxiety lest the outgo of gold should proceed too far before the harvests have matured, and especially in prospect of enormous imports of tin plates prior to July 1, sensibly affecting the balance of trade. It is supposed that much depends on the pressure Russia may bring to recover deposits standing to her account, and which has already forced the sale of large amounts of American securities. When American products begin to move out freely the tide will have turned. The weather crop bulletins show continued improvement in the spring wheat regions, wheat heading out well, while corn planting is about completed. Respecting Western trade a Chicago paper says: "The west-bound traffic of the lake and rail lines is the heaviest in their history. A surprising growth of lake-line business in the last three years is shown, and it is evident that the all-rail lines have good reason to fear lake competition. Particularly within a year has the lake traffic been pushed for all there was in it. One hundred hours from New York is now the average time for freight, which at least equals all-rail time, counting time from delivery to railroad to New York to delivery to teams at Chicago. The Trunk Line Association seems perfectly satisfied to let the traffic go to the lakes, as the railroads get the haul from the seaboard to Buffalo.

The stock market was dull and generally lower. A rally followed the appearance of the bank statement, but the tone was again weak on news of further gold shipments. On Monday lower markets in London were said to be caused by the agreement of the Bank of England and of the principal joint stock banks in that city to maintain the rate of discount. This movement, it was feared, would tend to draw more gold from New York, and the market became unsettled.

United States bonds were quoted as follows:

U. S. 4½s, 1891, registered.....	100
U. S. 4½s, 1891, coupon.....	100
U. S. 4s, 1907, registered.....	118
U. S. 4s, 1907, coupon.....	119
U. S. currency 6s, 1895.....	108

The weekly statement of the Associated Banks showed an increase in the amount of reserve held above the 25 % legal requirements of \$2,311,325. Loans contracted \$3,836,900. Deposits decreased \$4,098,100, which seems to have made the banks indifferent about buying commercial paper. Some prime short indorsed bills receivable still sell at 5½ %. Quotations are 5½ % for 60 to 90 days' indorsed bills receivable. Time contracts quoted at 5½ to 6 % for 60 days to six months on good collateral and 5 % for the same dates on prime, repayable in gold. The market for sterling was dull. Gold can be exported

at present rates, and no commercial bills are offering. Posted rates are \$4.85½ @ \$4.89½. In bank stocks, 20 shares of Western National sold at 98½ @ 100, and 50 of Metropolitan at 6½. In State bonds, \$5000 Alabama Class "B" sold at 108½, and \$5000 District of Columbia coupon at 115½.

The general markets show few radical changes. In wheat the export business was moderate and prices fell a fraction, owing to weak cables and better weather in Europe. Corn and oats were shaded on account of the large crop movement and better weather in the West. Coffee was unsettled. Cotton was ¼ lower. Lard was strong at an advance. Among dry goods' jobbers the outlook for the coming season has an unusually good basis, with prospects of a large export demand and high prices. In some woollens advanced prices were reached, and in cottons buyers had less advantage than could have been obtained last month. Recent failures in the clothing and jobbing trade were of an exceptional character and no index of the condition of trade, which continues conservative and healthy. Collections with some exceptions continue satisfactory.

The volume of general trade, as indicated by bank clearings, is moderate compared with the heavy totals for the corresponding period of last year. The decrease for the week in 60 cities is 21.5 % and for May 26 %. The only city showing a gain for May is Chicago, which increased 5 %. New York last week decreased 28.8 %; Boston, 25.1; Philadelphia, 18.1; St. Louis, 1.2; Baltimore, 21.5; Pittsburgh, 16.9; Kansas City, 12.9; Detroit, 13.3.

The Treasury Department's monthly debt statement shows an increase in the public debt during May, amounting to \$622,915. Receipts from all sources during the eleven months of the current fiscal year aggregate \$369,808,967, against \$364,537,088 during the corresponding 11 months of the preceding fiscal year. This points to a revenue for the entire fiscal year of \$397,000,000. Expenditures for the fiscal year will probably aggregate \$377,000,000. Secretary Foster is ready to announce that, on September 1, the Government will redeem all the outstanding 4½ % bonds falling due on that date, amounting to \$51,000,000, principal and interest. Nothing will be said in the call about extending the bonds at a lower rate of interest.

The disclosures of bank mismanagement in Philadelphia which follow the wreck of the Keystone and Spring Garden banks, are startling. To President Kennedy, who is now in prison, is traced \$690,000 of discounted paper. The Philadelphia *Ledger* speaks of altered accounts on the books, fabulous accounts and transfers to dust the vision of the bank examiner, scraps of paper in the cashier's drawer to the amount of more than \$100,000, all fabricated and utterly worthless, counted as "cash in legal tender notes," hundreds of thousands of dollars in speculative stocks, other hundreds of thousands in old "dead horses" of debts carried from one bank organization to another, over issues of stocks on which to raise money to cover up fraudulent transactions; officers in collusions and combines to defraud the bank, blind directors, who either could not see or would not see breaches of trust and unmitigated perfidy.

The total receipts from customs at the port of New York during May were \$7,449,775, of which 0.2 % was paid in gold coin, 27.8 % in gold certificates, 26.8 % in silver certificates, 15 % in United States notes and 32.2 % in Treasury notes. The receipts in May, 1890, were \$10,671,516, as follows: 0.2 % in gold coin, 0.1 % in silver certificates, 93.6 % in gold certificates, 2.5 % in silver certificates and 3.6 % in United States notes.

On Monday the Produce and Cotton Exchanges held their annual elections. On the Produce Exchange Evan Thomas was re-elected president, Thomas P. White vice-president and E. C. Rice treasurer. In the Cotton Exchange James O. Bloss, vice-president, and Charles W. Ide, president, were re-elected.

Metal Market.

Pig Tin.—During the week under review there has been an advance of nearly $\frac{1}{2}$ ¢ lb in price of the metal in this market and £1 $\frac{1}{3}$ ton in London. Speculative action based upon the strong statistical position is chiefly accountable for this turn, but a good, steady consumptive movement of supplies has a certain degree of influence, for the time being at least. The visible supply for Europe and America on the 1st instant was about 11,700 tons, or 440 tons less than on May 1 and 1040 tons less than a year ago. The spot stock here is estimated at 1900 to 2100 tons and the quantity afloat for this country at 2015 tons. Straits shipments last month were 1450 tons to Europe and 575 tons to America, against a total of 1775 tons in April. London stocks are 400 tons less than they were a month ago, but the quantity afloat is 550 tons greater. The strongest feature in the situation, however, is that supplies are under very close control and surface indications are that the "bull" element stand in better position than they have at any previous time during the past two months. Sales have been made here at 20 $\frac{1}{2}$ ¢, net cash, for prompt and July delivery, and at 20.70¢ for August. On Wednesday prompt delivery was quoted at 20.70¢, net cash, for 10-ton lots, and 20.80¢ @ 20.90¢ regular for smaller quantities. June and July deliveries about the same as spot.

Copper.—The market is looking firmer, chiefly under the influence of better demand from consumers, prompted in good part by a further considerable rise in prices of merchant bars in the English market and higher figures realized there for furnace material. There are now numerous inquiries for Lake Superior product at 13¢, instead of anxious sellers, as seemed to have been the case a week ago, and business involving a total of 500,000 lb or more has been effected at that price. Arizona Ingot is relatively stronger, being now quoted at 12 $\frac{1}{2}$ ¢, with some business at that rate, and common casting brands at 11 $\frac{1}{2}$ ¢ @ 11 $\frac{1}{4}$ ¢ are offered sparingly.

Pig Lead.—Transactions have not been as extensive this week as during the preceding one, but rather more speculative interest is manifested and the market seems to be relieved in a measure from the monotony of contest between producer and consumer. Prices have undergone a further slight advance, at which the market seems to be very firm just now. Probably 800 tons have been taken at 4.45¢ for prompt and near future delivery. The offering was somewhat reserved at the close and inquiries from consumers moderate, with no indication that the latter interest are alarmed at the speculative movement. Forsingle carload lots 4 $\frac{1}{2}$ ¢ was paid.

Spelter.—There is a firm undertone to the market, but limited offering by smelters plays a more conspicuous part than the consumptive demand in shaping the course of prices. As a matter of fact the actual business makes a rather poor showing for a market so apparently firm. On prime Western 4.90¢ is considered very close price and up to 5¢ is asked for best brands.

Antimony.—Prices have further receded and the market has been dull at the decline. Hallett's quoted at 14 $\frac{1}{2}$ ¢, LX at 15¢ and Cookson's at 15 $\frac{1}{2}$ ¢, in wholesale quantities.

Tin Plate.—The market has undergone a decided change. Weak holdings appear to have been marked off and under the influence of a good demand for supplies for delivery this month, prices improved all along the line. The rise was chiefly on Coke Finish Plates which are now generally held at prices 15¢ @ 25¢ above those at which offerings were free a week or ten days ago. Quotations for large lots on the spot are as follows: Coke Tins—Penlan grade, IC, 14 x 20, \$5.30 @ \$5.35; J. B. grade, do., \$5.45 @ \$5.50; Bessemer do., \$5.35 @ \$5.40; Siemens Steel, \$5.50 @ \$5.55. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.75 @ \$5.80; Siemens Steel, IC basis, \$5.90 @ \$6; IX basis, \$6.95 @ \$7. IC Charcoals—Melyn grade, \$6.30 @ \$6.35; for each additional X add \$1.50; Allaway grade, \$5.90 @ \$5.95; Grange grade, \$6 @ \$6.05; for each additional X add \$1. Charcoal Terns—Worcester, 14 x 20, \$5.50; 20 x 28, \$11; M. F., 14 x 20, \$7.40 @ \$7.50; do., 20 x 28, \$15; Dean, 14 x 20, \$5.15; do., 20 x 28, \$10.25; D. R. D. grade, 14 x 20, \$4.85; do., 20 x 28, \$9.80 @ \$9.85; Mansel, 14 x 20, \$5; do., 20 x 28, \$9.90; Alyn, 14 x 20, \$5; do., 20 x 28, \$10; Dyffryn, 14 x 20, scarce; do., 20 x 28, \$10.50. Wasters—S. T. P. grade, 14 x 20, \$4.75; do., 20 x 28, \$9.30; Abercarne grade, 14 x 20, \$4.70; do., 20 x 28, \$9.25.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, June 3, 1891.

On Friday last the price of Scotch warrants went as high as 58/9, owing to pressing demand to cover "short" accounts. Since then there has been a reaction of nearly 6/ under the influence of freer deliveries and relaxation of previous tightness. Apart from the closing of oversold accounts, nothing has occurred to strengthen values, and the whole speculation has had a bad effect upon general trade, leading consumers to expect a further considerable decline when normal conditions again prevail. There are now 64 Scotch furnaces in blast. Middlesborough and Hematite warrants followed Scotch in some degree on the advance, but responded more quickly to the downward movement. To-day's transactions in warrants were at 54/ @ 54/6 for Scotch, 40/3 @ 40/6 for Cleveland, and 50/ for Hematite. Stocks of Scotch in Connall's stores have decreased 24,000 tons, or to 513,000 tons. The stock of Cleveland has increased 5000 tons and amounts now to 126,000 tons.

Block Tin has had freer movement, with more liberal speculation, particularly in distant deliveries. The demand for futures was excited more or less by the strong statistical position, showing as it did a visible supply sufficient for only two months' average consumption, and shipments of but 1330 tons from the Straits last month.

Copper has been active and prices have advanced still further, with free buying for speculative account and for consumption on the advance. Furnace material is also in active demand, and anything offered was eagerly competed for. Two smelters have purchased a total of 6900 tons of Anaconda Matte for delivery during the balance of the year. European stocks have decreased 6617 tons during the month. Latest sales of furnace material include 100 tons Montana Matte at 10/; 450 tons do. on private terms; 300 tons do. at 10/3, and 200 tons Anaconda at the same price.

A decided improvement in the demand for Tin Plate has taken place, chiefly for

Bessemer, at 15/6 at Swansea, and a fairly large business has taken place. Holders are now asking higher prices and display greater firmness. Notices were issued on the 1st inst. advising employees that works would be shut down for one month in order to restrict the output. About 20,000 hands are affected.

Old Iron in the form of Rails and Wrought Scrap is inactive, but holders are stiffer on prices.

Steel Ship Plates are firmer at £6. 5/ and in somewhat better demand.

Scotch Pig Iron.—The movement in makers' Iron is moderate and prices are a shade weaker on most brands:

No. 1 Coltness, f.o.b. Glasgow.....	62/
No. 1 Summerlee, " " " " " "	60/
No. 1 Gartsherrie, " " " " " "	60/
No. 1 Langloan, " " " " " "	61/6
No. 1 Carnbroe, " " " " " "	55/6
No. 1 Shotts, " " " " " "	61/6
No. 1 Glengarnock, " " " " " "	59/6
No. 1 Dalmeilington, " " " " " "	55/
No. 1 Eglinton, " " " " " "	52/6

Steamer freights, Glasgow to New York, 2/; Liverpool to New York, 10/.

Cleveland Pig.—Business slow and prices still unsettled and irregular; makers quote 40/6 for No. 3 Middlesborough, f.o.b.

Bessemer Pig.—Demand is moderate and prices are a shade lower, with 51/ quoted for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

Spiegeleisen.—The offering is moderate, and prices remain firm, although demand is still light. English 20 % quoted at 95/ @ 97/6, f.o.b. shipping port.

Steel Rails.—A fair business passing and prices steady. Heavy sections quoted £4. 10/ @ £4. 12/6, and light sections £5 @ £6, f.o.b. at N. W. England shipping point.

Steel Blooms.—The market remains dull, and prices are without change. Makers ask £4. 5/ for 7 x 7, f.o.b. at N. W. England shipping point.

Steel Billets.—A moderate business passing at former prices. Bessemer, 2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ inches, quoted at £4. 10/, f.o.b. at N. W. England shipping point.

Steel Slabs.—No improvement in the demand, or change in sellers' figures. Bessemer quoted at £4. 10/, f.o.b. at N. W. England shipping point.

Old Iron Rails.—The market unchanged, both offering and demand moderate. Tees quoted at £2. 17/6 @ £3 and Double Heads £3 @ £3. 2/6, f.o.b.

Scrap Iron.—Very quiet market and no change in prices. Heavy Wrought quoted at £2. 10/, f.o.b.

Crop Ends.—No change whatever. Demand is slow. Bessemer quoted at £2. 15/ @ £2. 17/6, f.o.b.

Tin Plate.—The market quieter and prices somewhat irregular. We quote, f.o.b. Liverpool:

IC Charcoal, Alloway grade.....	17/9 @ 18/
IC Bessemer Steel, Coke finish....	15/9 @ 16/
IC Siemens " " " " " " " "	16/ @ 16/3
IC Coke, R. V. grade.....	15/9 @ 16/
Charcoal Terns, Dean grade.....	10/ @ 10/

Manufactured Iron.—No improvement in the demand, and prices barely steady. We quote, f.o.b. Liverpool:

Staff, Marked Bars.....	£ s. d.	£ s. d.
" Common " " " " " "	6 5 0	6 7 6
Staff, Bl'k Sheet, singles.....	6 5 0	6 15 0
Welsh Bars (f.o.b. Wales)....	5 12 6	5 15 0

Tin.—Market quiet at the close and rather easier. Straits quoted at £93. 2/6 @ £93. 5/, spot, and £93. 12/6 @ £93. 15/ for three months' futures.

Copper.—Prices a shade lower, and the market less active. Merchant Bars quoted at £54. 17/6 @ £55, spot, and £55. 10/, three months' futures. Best Selected, £59. 10/.

Lead.—Market steady, with fair business at £12. 10/ for Soft Spanish.

Spelter.—The market quiet at £23. 2/6 for ordinary Silesian.

HARDWARE.

Condition of Trade.

SINCE OUR LAST REVIEW the market has developed no specially new features, and the volume of trade and the general tone in regard to prices remains as before. There is a perceptible difference in the tenor of advices from representative manufacturers and jobbers in different parts of the country, which is to be explained in a large measure by local influences on trade. It would appear that, as a rule, a fair jobbing business is being done without, however, any specially active demand, and with evidences of conservative spirit on the part of retail purchasers. In seasonable goods there is a marked activity, and in most of these lines very satisfactory business is reported. The influence of strikes or labor agitations of one kind or another is felt in several markets. During the past week reported changes in prices of goods are comparatively few and unimportant, but the market, as a whole, is not regarded as characterized by any special strength. There has been for a number of weeks an evident sluggishness in collections, which still continues, though with indications of improvement in this regard.

Chicago.

(By Telegraph.)

The general Hardware trade is excellent, and business is steadily increasing. The demand for staple goods is better. May was the heaviest month ever known by some of the heavy Hardware houses, taking either the city or the country trade. The most important change noted in prices is in Loaded Shells. Manufacturers have issued a circular, taking effect June 1, naming 40 and 10 and 10 and 5 per cent. discount on lots of less than 50,000. Ammunition of other kinds is steady.

St. Louis.

(By Telegraph.)

There are no special changes to report in the Hardware trade. Business continues fairly active, with the bulk of the demand calling for seasonable goods. Bicycles are having a heavy sale, and jobbers have some difficulty in keeping their stocks replenished in certain sizes. Tin Plates continue weak, with little prospects of any immediate improvement. Cut Nails are slow to move at \$1.85. Wire Nails show some improvement in the demand and prices are quoted at \$2.20 to \$2.25, with prospects of an early advance on these figures. There are no particular changes in prices to report. Banks are well supplied with money, and collections are reported to be better than one week since.

Baltimore.

CARLIN & FULTON.—June in this section is probably the dulllest month of the year for sales. Orders from the cotton States are few and very small, and from now until the fall most of the cash in the South will be expended in the purchase of bacon and corn rather than Hardware. Some sections will realize considerable money from the shipments of early vegetables and melons, but unfortunately the advantages of rapid transit so necessary to such crops are not general. In this immediate neighborhood business will not be active until after the wheat harvest, which promises large results, and the indications are for abundant crops of all kinds, meaning more money for the farmer, and, as a natural result, a future improvement in trade. Local trade is affected by the removal of so many from the large cities to their suburban homes, and the retail stores complain very much on this account. Many firms take advantage of this month to take inventory of stock, ending the fiscal year July 1, and for this reason the present dullness of trade, which can be but temporary, is not to be so greatly regretted.

Louisville.

W. B. BELKNAP & Co.—The market is what stock brokers are pleased to call "a waiting market." We are all hanging on the crop reports, and every little sign of prosperity or the reverse as set forth from the Agricultural Department or from the mercantile agency's weekly *résumé* is eagerly caught on to and deductions for better or worse made therefrom. There is a fair amount of transient business doing, but no anxiety or rush for stock. Owing to the cold, dry weather, the navigation between Wheeling and the lower Ohio River points has been suspended, and the supply of coal is short at the down-river ports, consequently the local mills are trying to establish a better range of prices. They have succeeded reasonably well on Bar Iron and some sizes of Sheet, say to the extent of \$1 to \$2 per ton, but until the railroads come in as buyers for their usual supplies we do not look for much permanent improvement. Prices are so low and evidently unremunerative that manufacturers are indifferent about taking orders, and in most cases absolutely decline them for future shipment. Money matters are working close. The Southern banks are asking for accommodation earlier than usual this year, and claim that their customers made nothing on last year's crops. There was a large amount of cotton raised, but owing to the peculiar conditions the quality was poor and the price obtainable was extremely low. The country at large has been going through an immense liquidation, the largest ever known, we imagine, that did not precipitate a general panic. As a

nation we have manifested a financial strength of which we may well be proud.

Philadelphia.

SUPPLER HARDWARE COMPANY.—The volume of trade during the last two weeks has not been quite equal to the two previous weeks, although there is a fair amount of business doing, and no one, with truth, could say there is any appearance of dullness in the wholesale houses. Prices remain steady, indeed, with less disposition to weakness than there was six weeks ago. Mail orders from the interior country are fair in quantity, and all for goods urgently urged forward. Certain kinds of season goods still remain scarce. The misfortunes that have overtaken the American Machine Company, it appears, were anticipated in bank circles in the upper portion of our city, near where they were located, but the trade were led to believe that the scarcity of their Ice-Cream Freezers, &c., and the difficulty the jobbers had in getting their orders filled, was from the fact of unusually large orders booked by the company, instead of any inability to secure material. Orders from salesmen continue fair, and the resumption of work at nearly 20 iron furnaces in our State will naturally improve the trade in tributary locations. Remittances are only fair, and in many sections accounts run overdue. Failures show an increase over last year locally, as well as throughout the country at large. The recent developments in connection with two of the large national banks in our city are anything but savory, and have caused distrust to the extent that city trade has been greatly affected. People are apt to keep money in their vaults rather than make free use of the national banks as depositories for the same, or hoard their funds, fearing further trouble, rather than to pay their bills. It is therefore natural that banks should husband their resources and discount in the most limited manner. We suppose there is no city in the country that has suffered in this particular as much as our own, and our city business has been greatly affected. The scandal connected with the City Treasury transactions, not only caused the failure of the Treasurer's own private business, but has created a stench that is far-reaching, and caused a loss to the city of perhaps nearly \$1,000,000.

Unfortunately, there are always persons who desire to make capital from sensational matters of this kind, and, we regret to say, occasionally for their own benefit, and in many cases do not always have in view the public good. Ostensibly probing into very large holes or chasms, they ferret out small crevices, endeavoring to create bad odor, instead of approaching at once to the large holes and chasms wherein to find the dumpings of the city money. This has affected trade in our

city to a wonderful extent. Projected improvements have been abandoned and large industries have husbanded their resources. Collections have been materially affected, and no new projects are being started. All prudent business men in industrial and manufacturing interests are anxious to quickly see the end, knowing that longer delay is dangerous to an extent that is scarcely appreciated by those who frequently have matters of this kind under their control. Reports from sections tributary to our city report excellent prospects for grain, which will be marketed this fall, and a good fruit crop that will precede it.

Omaha.

LEE - CLARKE - ANDRESEN HARDWARE COMPANY.—The jobbing trade of Omaha appears to hold up well, the conditions remaining very much the same as were noted in our previous reports. Orders are not large, but loom up in numbers, indicating that country dealers intend to continue confining their purchases within the conservative limit until the magnitude of the coming harvest can be ascertained to a certainty, when they will be compelled to augment their stocks to supply the autumn demand. In the way of weather everything is favorable for the growing crops. Owing to the promising outlook farmers are confident of an abundant yield, the ground being in good shape and everything favorable; while conditions in Europe are such as are expected to maintain the market for the leading farm products in the face of a heavy crop in this country. An assured heavy fruit crop this season has already asserted its value and influences the general prosperity, both present and prospective, to a considerable extent. Money is easy on good security, but for speculative purposes close scrutiny seems to be the policy of loaners. Higher prices for some lines of Hardware, which now rule abnormally low, are looked for before the fall season is inaugurated. Just now Wire Nails are attracting some attention, the market for this staple appearing to be a "jug handle" in favor of the buyer.

Portland, Ore.

FOSTER & ROBERTSON.—Trade, which two weeks ago was running a little under the usual average, shows a marked improvement within the last few days, but the gain, coming as it does just at the close of the month, will have very little effect upon the entire month's business, which will be slightly less than previous months, but the outlook for June is such as to indicate something of a gain. Orders, both through travelers and by mail, are very generally distributed over our entire stock, except perhaps in logging tools, such as Cross-Cut Saws, Axes, Peavies, &c., the call for which is unusually light.

As indicated in our last letter, Axes have weakened, and are now being offered at from 50 cents to \$1.50 per dozen less than the price of January 1st. We have also to note still further declines in the price of Rope and Nails, the former being held at 12½ cents base for Manila and 9 cents

base for Sisal, and the latter at \$2.85 base for Steel Cut and \$3.40 base for Wire.

Collections, although not at all easy, are doing fairly well, and indicate quite a reasonable gain up to the present time over the same months of last year.

Boston.

BIGELOW & DOWSE.—The past week or ten days shows a slight falling off in the volume of business; still all the retail dealers seem well satisfied with their spring trade.

Prices are a little irregular, owing to the anxiety of some manufacturers to make sales. It is a question, however, if they accomplish their object by offering extreme prices to small dealers, who use their prices to buy elsewhere.

Remittances are still slow, but are better than they have been.

Cleveland.

THE W. BINGHAM COMPANY.—The volume of business for the last month is greater than last year at the same time, and it starts out well this month. Travelers are sending in well-assorted orders. The demand for plain and Barbed Fence Wires still continues good, and the business in this line from this point will greatly exceed the tonnage of any previous year. Season goods are in good demand, and no one will be obliged to carry any over, as manufacturers are short of some kinds. Steel and Wire Nails continue weak, but we anticipate and hope for higher prices soon. The rain we prayed for last week has come to us in gentle showers, which are very refreshing, and make every one feel bright and happy, as all indications point to good crops in this section, with the exception of the small fruits that were hurt by the frost in May.

San Francisco.

HUNTINGTON - HOPKINS COMPANY.—Trade has fallen off in a slight degree. This does not apply to the Hardware line alone, but to all other lines. It may be that it is owing to the fact that spring ordering is about over and nothing will be done until after harvest, when merchants begin to order for winter stocks. Yesterday the State was visited by a heavy rain storm, which was quite widespread. Whether or not it may be considered a blessing remains to be seen. Reports coming in from various parts of the State show that it has damaged the standing grain and cut hay to a slight degree. This, probably, is offset by the good that has been done to young orchards and vineyards. In addition to the harm done to the grain, ripening fruit and berries have also been slightly hurt, and, as we said before, we are unable to state what effect this will have, but still we feel it will not have any very great damaging effect. Collections are still poor, and, as we have written you in former reports, will be no better until after the wheat and fruit crops move, which they are now beginning to do. We have also to advise you that possibly competition will be a little closer than heretofore, owing to the fact that since our

last report a new Hardware house has opened, and is making its bid for its share of the trade.

Notes on Prices.

Cut Nails.—In this market as well as in the West there has been no change in the prices of Iron or Steel Cut Nails during the past week. There seems to be a disposition on the part of some of the mills to obtain slightly better prices, but the condition of the market has not permitted this, and quotations remain on the basis of \$1.55 at mill, a figure from which, however, concessions are made in special cases. While there have been some large sales, the demand as a whole is regarded as only moderate. Small lots from store in New York are held at \$1.75 to \$1.80; in carload lots at dock \$1.65 to \$1.70.

Chicago, by Telegraph.—Manufacturers report a good trade in comparison with March and April and the early part of May. A transaction which occurred last week is worth noting. The Laughlin Nail Company, through their salesman in Chicago, George G. Spencer, received an order for upward of 20,000 kegs of Steel Cut Nails, which is believed to be the largest single order for such goods placed in this country for several years, and perhaps the largest order placed since the same company made their famous sale of 50,000 kegs to a Western jobber. The order just taken was placed by a house outside of Chicago, and at a price slightly higher than was named by competing manufacturers. Other large contracts are pending. The general rate for a 30¢ average is \$1.70, Chicago, from factory. Jobbers quote \$1.80 for small lots from stock, but all of them are not adhering strictly to this price.

Wire Nails.—The market remains unchanged since our last report. Quotations are on the basis of \$1.95 @ \$2 for carload lots at mill. Small lots from store are held at \$2.25 @ \$2.30.

Chicago, by Telegraph.—Continued weakness rules in the Wire Nail trade. It appears to be well established that the demoralization is caused by one manufacturer after another unloading his surplus stock. After cleaning out his warehouse, the manufacturer advances his price, but, of course, cannot get it, because his example has been followed by another maker. Four of the leading concerns have thus far participated in these raids on buyers. The prices made have been special, but, of course, very low. For the average buyer \$2.05, Chicago, appears to be the price for factory lots. Jobbers sell at \$2.15 from stock, but shade this rate to best buyers.

Barb Wire.—Manufacturers continue busy, but there appears to be a slackening in orders. There is, however, still some difficulty on the part of jobbers in obtaining the Wire as rapidly as needed. Quotations are without change on the basis of \$3.50 for Four-Point Galvanized and \$2.95 for Painted, with the regular abatement of 10 cents for carload lots and 5 cents for jobbers and railroads; terms 60

days, or 2 per cent. discount for cash in ten days, with delivery at leading points.

Chicago, by Telegraph.—Manufacturers report a large trade in progress, although jobbers' contracts have generally expired and they are hesitating about renewing them on the basis now prevailing. An apparent shortage exists in Four-Point Wire, which until very recently has been produced in excess of the demand. Jobbers report a very fair trade, and continue to quote \$2.80 as bottom on Painted, irrespective of quantity.

Orange Knives.—The following are the prices of Orange Knives, or Norwich Fruit Knives, made by the William Rogers Mfg. Company, Hartford, Conn., the prices being given subject to a discount of 5 per cent. for cash :

No. 12, Plain or Satin, one or six in case, per dozen.....	\$2.40
No. 12, Etched or Arabesque, one or six in case, per dozen.....	2.65
No. 12, Old Silver, one or six in case, per dozen.....	2.90

For shipments of 25 dozen at one time, or 50 dozen in a year, a jobbers' rebate of 25 cents a dozen is allowed. Any of the Company's No. 12 Fruit Knives and Steel Nut Picks can be included to make up the quantity.

Orange Spoons.—The following is the price-list of Orange Spoons of the William Rogers Mfg. Company, Hartford, Conn. It is subject to a discount of 40 and 15 and 5 per cent., with an additional 5 per cent. discount for cash.

	Per doz.
Satin Silver, one or six in case.....	\$6.50
Satin Gilt, one or six in case.....	7.50
Burnished Gilt, one or six in case.....	9.50

Glass.—The price of American Window Glass remains the same as for the past few weeks. The local lockout in the lumber trade still continues and is extending to the surrounding cities. This affects the building interests and reduces the demand for Glass. Pittsburgh advices report trade somewhat slow, though there is said to be more doing at Western points. It is understood that during the time of low prices last spring large orders were placed with the manufacturers at 80 and 20 and even at 85 per cent. discount, these contracts covering all shipments for the season, or until July 1st. Glass is now doubtless being stocked by manufacturers to meet the summer demands. The amount of Glass on hand September 1 will depend, of course, upon the consumption during the summer. The price of imported Window Glass has declined to 75 and 10 and 5 per cent. discount, in small quantities, with the additional 5 per cent. for 50-box lots during any calendar month. During the past week the price of French Window Glass dropped to 80 per cent. discount and in a few cases was sold at 80 and 5 per cent. discount. This break in price is attributed to Boston dealers and for the time it looked as if a war on prices had been inaugurated. The market, however, recovered itself and prices are now firm at the above decline. Prices on Glass are quoted as follows: American Window Glass, for carloads, 80 and 10 per cent. discount; less than car lots,

80 and 5 per cent. discount; French Window Glass, 75 and 10 and 5 per cent. discount, with an additional 5 per cent. discount when 50 boxes are ordered and taken in any calendar month. American Plate is held at discount 50, 10 and 5 per cent., and Imported Plate at discount 60 per cent.

Loaded Shells.—Under date June 1 the associated manufacturers of Loaded Shells announce a reduction, whereby the discount on Loaded Shells is made 40 and 10 and 10 and 5 per cent. on orders for less than 50,000 lots. All orders entered and not completed by October 31, 1891, will be considered as void. On shipments of 20,000 or more freight will be equalized with Chicago, St. Louis or Cincinnati. This action, which is a reduction of 10 per cent., is understood to have been taken on account of the cutting of prices by outside manufacturers, which has given the market some irregularity for several months. Existing prices are regarded as very low, and are referred to by the manufacturers as below the cost of production. The indications point to a large business during the season, which will doubtless be stimulated by the reduction, and it is thought probable that there will be something of a scarcity before long.

Lead Pipe and Sheet.—Under date June 1 Bailey, Farrell & Co., Pittsburgh, Pa., announce the following revised prices, which are subject to the usual discount of 10 and 5 per cent. :

	Per pound.
Lead Pipe, in whole coils.....	\$0.06
Sheet Lead, ".....	.06½

The Eastern manufacturers have not, as far as we can learn, made a corresponding change.

Cordage.—The Cordage market continues in a very unsettled state, and although no official reductions have been made in prices, it is understood that some of the outside makers are shading figures which were adopted a couple of weeks ago. This is especially the case in regard to Manila Rope, the manufacturers' price for which, in large lots at factory, is supposed to be 9½ cents, but by outside parties this is, in some special cases, shaded ¼ cent. Sisal and New Zealand remain without change.

Trade Items.

WHILE NEGOTIATIONS are progressing with reference to the consolidation of a number of Western Wringer companies with the prospect of their successful consummation, it is announced that the Erie Wringer Mfg. Company, Pittsburgh, and the Pittsburgh Mop Wringer Company of the same city will consolidate about June 15. The location of the main factory and offices has not yet been definitely determined.

WE UNDERSTAND that a special representative recently sent by a leading commercial agency of this city to Australia, to establish a colonial branch of their agency business, has been meeting with a warm reception from the merchants on whom he had called for ratings, &c., many of the firms absolutely refusing to give any information desired, looking upon his requests as

little short of a personal insult. Evidently the colonial merchants are not much taken with our American agency system of ratings.

IN THEIR ADVERTISEMENT in another column Walter W. Woodruff & Sons, Mount Carmel, Conn., illustrate their well-known Mount Carmel Steel Toe-Calk Ox Shoes, which are made in six sizes each sharp and blunt. We are advised that these are the only Steel Toe-Calk Ox Shoes in the market, and that the yearly increasing sales attest their superiority over any Shoe made.

THE H. M. MYERS COMPANY, Beaver Falls, Pa., advise us that Harrison Parkman of Philadelphia sailed for South America June 3 with a full line of their samples, and will represent them direct, together with four other lines of goods manufactured in the United States. He expects to be absent one year.

E. C. STEARNS & Co., Syracuse, N. Y., are sending out a card with a hole 1½ inch in diameter in it. This is referred to as a Trick with a hole in it. The trick consists of putting a half dollar through the hole without tearing the paper. They state, however, that it is no trick to sell the McGuire Star Stove-Pipe Thimble, which is manufactured by them. As may be surmised, the object of this card is to bring the McGuire Star Stove Pipe Thimble more prominently before the trade.

IT IS ANNOUNCED, under date June 1, that Royal R. Upson has sold to Ralph A. Wooding and Augustine F. Wooding his interest in the business of the Upson and Wooding Mfg. Company, Kensington, Conn. Ralph A. Wooding and Augustine F. Wooding will continue business under the old name, and will assume all debts and liabilities and collect all accounts due them.

WE ARE ADVISED that the Improved Process Glue Company, which, in January last, succeeded to the business of the Le Page Company, in the manufacture of Liquid Fish Glues, under the personal supervision of Mr. W. N. Le Page, paid, May 15, its first quarterly dividend of 2½ per cent. from its earnings.

MANY PEOPLE in the metal trade will be interested in the good fortune of Chas. H. Bolles, Jr., the New York representative of Merchant & Co. He was married at Lt. Luke's Church on Wednesday, June 3, and consequently will be out of town for a week or two. Mr. Bolles has proved himself a very agreeable and efficient manager of a branch house, and we know that all will wish him joy and prosperity in this new copartnership.

ANNOUNCEMENT IS MADE that the Energy Mfg. Company, Philadelphia, have sold plant, patterns, &c., to McCabe & O'Neill, who, with improved machinery and increased facilities, are prepared to furnish all of the machines made by the late concern. The parties comprising the new firm are referred to as young men with large experience in the machine business, and who understand the manufacture of these goods thoroughly.

IN HIS ADVERTISEMENT in this issue Charles J. Healy, 106 Chambers street, New York, refers to the varied line of goods in the sale of which he is importer, exporter and manufacturers' agent. Cuts are also given showing two of the Padlocks which he is offering.

AMONG THE SPECIAL NOTICES in this issue under the head of Help Wanted is an advertisement signed "H. B.," for an assistant buyer. We direct special attention to it, as the house making the announcement is a prominent one, occupying a high position and doing a large business. The assistant buyer is desired especially for

their Iron and Steel and Pipe department, and the opportunity would seem to be an exceptionally favorable one for a man who has the requisite qualifications.

IN THEIR ADVERTISEMENT on another page the William Rogers Mfg. Company, Hartford, Conn., illustrate their solid steel Carvers, and call attention to the manner in which they are manufactured and put up.

THE FIVE MANUFACTURERS, Dunbar, Hobart & Co., Albert Field Tack Company, Loring & Parks, Taunton Tack Company and American Tack Company, whose interests have been merged in the Atlas Tack Corporation, issue separate circulars conjointly with the corporation, making formal announcement of the consolidation and giving information in regard to the conduct of the business and the addresses of warehouses, agencies, &c. It is also announced that J. H. Graham & Co., 113 Chambers street, New York, and Wier & Wilson, Baltimore, are selling agents for the goods. In the circulars issued by Loring & Parks and other Rivet manufacturers it is mentioned that correspondence relating to these goods is to be addressed to the factories as heretofore.

THE FAILURE of the American Machine Company, Philadelphia, is announced, with liabilities which may reach \$300,000, and assets estimated by the company at from \$150,000 to \$200,000. Although the company have been known to have been in straitened circumstances for some time, Herman Albrecht their president attributes the failure to the closing of the Spring Garden Bank, in which institution the company's paper, almost equal to their capital stock, was discounted.

THE NORWICH LOCK MFG. COMPANY, Norwich, Conn., whose advertisement appears on another page, have had the matter of the removal of their plant to some place within the coal and iron belt and nearer the base of supplies under advisement for several months, and thriving localities in Alabama, Georgia, Tennessee and other States have been visited to determine which offered the best advantages for the prosecution of the company's work. The company after much consideration have decided to locate in Roanoke, Va., a city the population of which has grown from less than 1000 in 1881 to 22,000 in 1890. The capital stock of the company, which is now \$150,000, will, we are advised, be increased at least \$200,000, and it is intimated that the paid-up capital when the new plant is in full operation may be \$400,000. The prospective plant will consist of 6 acres of land and two large buildings, the workshop, with wings, being about 189 x 200 feet, with a well-equipped foundry in the rear. Work will be begun upon it at once, and it is probable that the buildings will be in readiness the coming fall. The company expect to take with them such of their skilled workmen as desire to go South. The present stockholders of the company will retain their interests, and Charles H. Beebe will continue as secretary, treasurer and general manager. The trade will read with satisfaction these evidences of prosperity and enlarged enterprise on the part of this well-known company.

IN A CIRCULAR dated May 25 it is announced that the business arrangement which has existed between E. R. Warner and G. A. W. Dodge, under the firm name of Warner & Dodge, Jackson, Mich., since April 1, 1871, has been discontinued by mutual consent, Mr. Dodge withdrawing for the purpose of assuming the position of president and general manager of the Michigan Red Stone Company. The business will be continued by E. R. Warner and his son, Edward Dodge Warner, under the firm name of the Warner Hardware Company.

THE OCCASION of the formal opening of the W. J. Pratt Hardware Company's new store at New Whatcom, Wash., on May 11, was, we are advised, a most interesting event. Hundreds of invitations had been sent to the citizens, friends and customers of the company, and were in nearly all cases accepted. A large procession traversed the streets of the city, and contributed not a little to making the day a gala one. The Reception Committee consisted of Fred. Lee, the head traveling salesman of the house, and M. H. Hawkins, the head bookkeeper. The company furnished the gentlemen callers with cigars, while the married ladies were presented with silver sugar shells and the younger ladies with beautiful pocket knives. The store, both inside and out, is described as a handsome one, and on this occasion it was most profusely decorated with flags, bunting, &c.

J. E. MASON, St. James Hotel, Norfolk, Va., in an advertisement on another page of this issue illustrates his Pan Lifter, the patent on which or the right to manufacture and sell on royalty he offers for sale. A description of the Pan Lifter is given, and the statement made that there is no danger of breaking or marring the top of the crust of the bread or other material contained in the pan. The fact that the jaws or handles are of sufficient length to prevent burning the hands by too close proximity to the hot pan which is to be lifted is also referred to.

Trade Topics.

IN OUR recent correspondence come inquiries in regard to several matters of general interest, some of which we refer to below, and shall be glad to have replies or suggestions from our readers.

Spot Cash.—Will you please inform me what is really the commercial meaning of spot cash? Is it ten days from the date of invoice, or what is it?

Railroad Bill of Lading.—We have the following letter from a prominent house, in which they call attention to the inconvenient size of the bill of lading. There is certainly force in the suggestion that its inconvenient proportions might be diminished if much of the printed matter were put on the back. At the same time it will doubtless occur to many of our readers that the Bill of Lading contains an unnecessary amount of verbiage, and might, with advantage and without any detriment to the rights of interested parties, be given in a much shorter and more concise form:

It seems singular to us that there has not been more remonstrance against the proportions of the new form of the Railroad Bill of Lading. It is about 8½ inches wide by something over 14 inches long and will not go in any ordinary letter file without folding. A Bill of Lading is an essential adjunct to an invoice and should be filed with it, but we suggest to the railroads, unless they are in league with the paper makers, that they utilize both sides of the paper and print their conditions and more or less of their advertising on the back. This would reduce the paper to half of its present size, which is large enough.

The best Bill of Lading we get is the smallest, where the rate and weight is inserted and a little printing equivalent to the statement that the goods are taken "subject to the ordinary rules of transportation." This is all that is necessary, it seem to us, as these rules are fairly well defined. What we want to do in

these days of complex business is to condense as to dimensions and matter rather than to expand.

We think all of your readers should unite in a request to the railroads that as soon as the present stock is exhausted they give us something more modest in the way of a Bill of Lading.

McCoy & Sanders

THE FIRM of McCoy & Sanders, 26 Warren street, New York, was dissolved May 30, by mutual consent. Walter Sanders becomes a member of the firm of Alfred Field & Co., 93 Chambers and 75 Reade streets, who take all the Cutlery and Hardware stock heretofore carried by McCoy & Sanders. They also have the agencies of the French Toilet and other well-known Clippers manufactured by Peugeot Frères; also the warranted line of fine Tools, Pliers, &c., made by L. Hugoniot Tissot. The business formerly carried on by McCoy & Sanders will be continued by J. F. McCoy Company, at 26 Warren street, as general import and export agents, handling miscellaneous Hardware, Railroad and Mill Machinery, and making a specialty of all kinds of Hardware, Machinery and Tools.

The trade will note with interest these changes in this old and well-known house, whose business was originally established in 1806, and will extend to those in interest the best wishes for their success in this departure.

Hardware Association.

THE NEW YORK STATE Jobbers' Hardware Association was tendered a banquet by Howe & Co., A. E. Bone-steel and J. M. Warren & Co., Troy members of the Troy Club, at Troy, N. Y., May 28. There was a large number in attendance. Among the after-dinner speakers were: Ex-Mayor William Kemp, Gen. Joseph B. Carr, Messrs. McCarthy and Walbridge, of Buffalo; Mr. Matthews of Rochester, Mr. Weed of Buffalo and Frank Edmonds of the Troy Steel and Iron Company. Among the other guests were Col. Walter P. Warren, John W. Griswold and Chas. Booth, of Worcester. In the morning a business meeting was held at which matters pertaining to the trade were discussed.

Price-Lists, Circulars, &c.

THE TOLEDO BOLT AND NUT COMPANY, Toledo, Ohio: C. C. C. Improved Gimlet-Pointed Coach Screws, Bolts, Nuts, &c. Illustrations and list prices are given of Stove, Elevator, Common and Philadelphia Tire Bolts; Common Carriage Bolts, Sleigh Shoe Bolts, Machine Bolts, with square heads and nuts, Gimlet-Pointed Coach Screws, Bolt Ends, with square nuts, and Plow Bolts. Also Hot-Pressed Square and Hexagon Nuts, Plate Washers, &c. Accompanying their catalogue is a pamphlet containing official telegraphic code of the Bolt and Nut Manufacturers' Association of the United States. The catalogue is elegantly printed and will be appreciated by the trade.

GWINNER, DOWREY & Co., Hamilton, Ohio: Casters, Stove Truck, Store and Factory Trucks. Illustrations and descriptions are given of Gwinner's Common Sense Caster for various uses, in a num-

ber of styles and sizes, Gwinner's Hercules Truck Caster, Large Rigid Caster, Gwinner's Hercules Truck, and Common Sense Adjustable Stove Truck.

PECK & SNYDER, 124 to 130 Nassau street, New York: A price-list for the trade only of Lawn Tennis, Base Ball, Archery, Croquet, Lacrosse and Foot Ball goods; Lawn Tennis, Base Ball, Boating, Outing and Athletic Uniforms, Air Guns, Darts, &c.

R. HOFFELD & Co., Buffalo, N. Y.: Leather Belting, Axle Washers, Rubber Goods for mechanical purposes, Machinery, Tools and Supplies, Iron and Brass Working Machines and Tools, Full Machine Shop Supplies and Factory Equipments, &c.

SIMMONS HARDWARE COMPANY, St. Louis, Mo.: Lawn Tennis goods. Circular No. 202, with price-list, devoted entirely to these goods.

THE ROGERS CUTLERY COMPANY, Hartford, Conn.: Solid Steel Handle Carvers, Medium, Dessert and Fruit Knives, &c. The manufacturers state that their Carvers are made of the best quality carver steel and are carefully finished and warranted. They are plated triple plate, and are put up in satin-lined boxes, without extra charge.

H. McDONALD, Bellefontaine, Ohio: Peterson Corn Harvester. This consists of a sled, with side extensions or wings, hinged to the platform of the sled. These extensions have knife edges, which cut the corn stalks as the sled is drawn through the field. The operators stand, one on each side of the machine. The knife as it strikes the corn stalk is designed to bend over enough to give a slanting cut; the operator, putting his hand out in front, catches the corn as it is cut, and brings it back on to the wing. When the Harvester is not in use the wings are folded back on to the sled. It is claimed that with the Harvester 200 to 300 shocks of corn can be cut in a day. The manufacturer advises us that the Harvester is meeting with large sales, and that it is with difficulty that orders are filled promptly.

THE H. M. MYERS COMPANY, Beaver Falls, Pa.: Spanish price-list for export trade, relating to their Shovels, Spades, Scoops and Drain Tools. Wm. C. Barker Company, 69 Beekman street, New York, are in charge of their export office, where a full line of samples are carried, catalogues furnished and prices quoted.

OHIO LANTERN COMPANY, Tiffin, Ohio, and 34 Wabash avenue, Chicago: Lanterns, Lamps and specialties. Tubular Lanterns are shown in Surprise, No. 0, Regular, Standard; and the Surprise Dash Board Lantern with detachable reflector. Also Double-Guard Brilliant Lantern for coal oil; Economy and Crescent Side Lamps.

THE E. COVERT MFG. COMPANY, Farmer Village, N. Y.: Price-list No. 15. They call attention to this their fifteenth annual catalogue, in which they have aimed to give their customers a complete list of their manufacture, which embraces a large and varied assortment in General Hardware, Saddlery Hardware and Carriage Goods; and allude to the many new and useful articles in these lines which are offered for inspection. They have introduced many new and special machines, and in other ways increased their facilities for carrying on their growing business. Sheets containing wholesale net prices to the jobbing trade accompany the price-list.

THE ANSONIA BRASS AND COPPER COMPANY, 19 and 21 Cliff street, New York: Sole manufacturers of Tobin Bronze. Pamphlet No. 166 contains a treatise on this Metal, with instructions for ordering and using it. A table of weight in sheets and rods; results of tests of its tensile strength, elasticity, &c., and testimonials from manufacturers and others who are using Tobin Bronze. The Metal is furnished in form for Ship Sheathing

and Fastening, Pump Rods and Yacht Shafting, Sheets and Plates for Pump Linings, Condenser Heads, Tube Sheets, &c. Round, Square and Hexagon Bars. The manufacturers state that Tobin Bronze, when rolled hot, is remarkable for its high elastic limit, tensile strength, toughness and uniform texture, and is stronger than ordinary mild steel rods or plates; that at a dead red heat bolts and nuts can be forged from it, at a dark red heat it can be drop-forged in the same manner as steel, and that it is adapted for working in the lathe, being drawn into wire, being cold drawn, &c. An extensive list is given of the uses for which it is suitable.

ORR & LOCKETT HARDWARE COMPANY, Chicago, Ill.: Circular illustrating and describing their Skidmore's Adjustable Window Balcony. Some of the prominent buildings to which the Balcony has been applied are also mentioned.

SNELL MFG. COMPANY, New York: Prices and illustrations of their entire line of Ship Augers, Auger Bits, Boring Machines and Boring Implements. It is interesting to notice in this connection that this company were established in 1790, and that they have received first premium awards at Massachusetts in 1841, 1848, 1850; at the Centennial Exhibition, Philadelphia, 1876; and at the International Exhibition, Paris, 1878.

LIVINGSTON NAIL COMPANY, 104 Reade street, New York: A comprehensive line of Horse Nails, Horse Shoes, Ox Shoes and Toe Calks. A specialty is made of Horse Nails for export, making different patterns for foreign countries as required. In their catalogue they include Rasps, Files, Tools, &c.

It Is Reported—

That Lafayette Smith is about to open his new Hardware store at Waymart, Pa.

That H. T. Reid & Co., New Westminster, B. C., dealers in Hardware, were burned out recently. Loss, \$4,000.

That Le Seur & Widman have succeeded the Hardware firm of Davenport & Evans at Appleton, Minn.

That Louis Steinke is the proprietor of a new Hardware store at Forman, N. D.

That F. R. Field has recently begun the Hardware business at Sanborn, Iowa.

That T. Mills has embarked in the Hardware, Stove and Agricultural Implement business at Moline, Kan.

That H. A. Benson & Co., Hardware dealers, Kensington, Minn., have been succeeded by Hoode Bros.

That the Henk Hardware Company have succeeded Henk & Greiner, Chaska, Minn., and will continue the business on the same lines as heretofore.

That G. A. and Louis Link will open a new Hardware store at Fort Madison, Iowa. The firm name will be Louis Link & Co.

That the Hardware establishment of Lindley & Veazey, Jeffersonville, Ind., was entered by thieves on the 24th ult. and robbed of goods valued at \$100.

That William Babcock has sold his interest in the Babcock & Pierpont Hardware store at Galesburgh, Ill., to Josiah Babcock, Jr.

That C. E. Cross has succeeded the firm of Cross & Rosier, dealers in Hardware, Stoves, &c., Doon, Iowa, having bought the interest of Mr. Rosier. Mr. Cross will continue the business under his own name at the old stand.

That E. E. McMillan dealer in Hardware, Stoves and Agricultural Implements, Motley, Minn., has been succeeded by Mrs. T. A. Morrison.

That Mr. Emly will start a Hardware store at East Berkeley, Cal., at an early date.

That Kalb, Holmes & Hood is the name of a concern which has recently entered the Hardware business at Pratt, Kan.

That J. N. Utter & Son have purchased the Hardware stock of G. L. Manning & Son, Bucoda, Wash., and will continue the business.

That Frank I. Reed's Hardware store at Richmond, Ind., was burglarized on the 24th ult. Revolvers, Razors, Pocket Knives and Scissors comprised the stolen goods, the value of which is about \$90.

That R. H. Crippen is the proprietor of a new Hardware store at Tonawanda, Pa.

That D. L. Woodward has bought the business of Woodward & Seymour, dealers in Implements, &c., Ortonville, Minn.

That James Davis and Edward Lotts have purchased the Hardware store and stock of E. D. Nauman, Blairstown, Iowa.

That Crouch & Stillwell have succeeded the Hardware firm of Stillwell & Pollen, Carrollton, Mo., N. E. Crouch having purchased the interest of Mr. Pollen.

That Charles Mentzel, Hardware, Spangle, Wash., has disposed of his business to Gneas Bros & Co.

That Walker & Wilkinson, dealers in Hardware, &c., Caledonia, N. Y., are rebuilding their store.

That Graham Watts, a leading Hardware merchant of Honesdale, Pa., has commenced the erection of a double brick block on Front street, in that city.

That Allen & Davis, Hardware dealers, Hearne, Texas, were burned out on May 27.

That Gille Hardware Company, Kansas City, Mo., have been incorporated, with a capital of \$150,000.

That S. Jetmore has purchased the Hardware stock of L. Becker, Newton, Kan., and will remove it to Marion, Kan.

That W. A. Hammer has bought the Entwistle & O'Dea Hardware stock in Des Moines, Iowa.

That J. A. Winters & Son have opened a new Hardware store at Midway, Pa.

Orr & Lockett Hardware Company's Catalogue.

ORR & LOCKETT HARDWARE CO., Chicago, Ill., have just issued an elaborate catalogue and price-list of Mechanics' Tools. It is bound in flexible paper covers, something over 8 x 11 inches in size, and contains 208 pages of illustrated and descriptive matter relating to Tools. An alphabetically arranged index occupies a position in the front part of the work, also some valuable directions of how to order Tools. Referring to the scope of the catalogue, the firm state:

In presenting our catalogue of Mechanics' Tools and Wood-Working Machinery we take pleasure in stating that the intelligent buyer will find it to contain the greatest variety and the best selection of these goods that has ever been issued. It embodies the result of an experience of a quarter of a century, and of a most careful examination of all the standard catalogues of similar goods now in use. In its pages will be found what is requisite to supply the wants of the blacksmith, the molder, the bricklayer, the plasterer, the cabinet maker, the carpenter, the carriage maker, the electrician, the machinist, the manual training school, the stone mason, the wagon maker and the upholsterer. As we handle only the best goods, our standard of quality is the highest that it is possible to attain. Our prices will always be as low as is consistent with quality.

As a book of reference and information the catalogue is destined to prove valuable.

Iron Age Hardware Price Books.

THE IRON AGE HARDWARE PRICE BOOKS A, B and C have evidently met a want of the trade, two editions having already been exhausted. The third edition, which is now ready for distribution, has been improved in many ways; notably in the quality of paper, strength

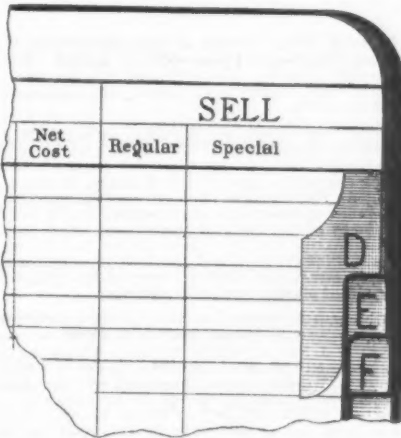


Fig. 1.—Canvas Tabbed Index.

of binding and the style of index. We desire to direct special attention to this new index, which is shown in Fig. 1. This is known as a canvas-tabbed index, the index letters being printed on canvas, the canvas extending on both sides of the page. This not only improves the appear-

price; all the information being on the same page. In Book A the rulings extend across two pages, the information regarding the goods being on the left hand, while that relating to prices is on the opposite page. These books are both 4 x 7 inches in size, bound in grain seal leather. Book C is larger in size, being 4½ x 7½ inches, the rulings running lengthwise of the book. In these books care has been taken to give each letter the proper amount of space for the accommodation of Hardware articles; and suggestions from prominent and experienced Hardwaremen have been acted upon in bringing the books to the present state of adaptedness to the requirements of the trade.

Price Book D.

Price Book D, an entirely new book, is shown in Fig. 2, and is now ready for distribution. It is larger than A, B or C, being 5½ x 8 inches, bound in a fine quality of grain seal leather. It is of superior quality throughout, and will recommend itself particularly for desk and store use; also as a convenient book for the use of salesmen on the road. The paper is heavy and of fine quality, allowing erasures to be made. The binding is very substantial, and the index canvas tabbed, as shown in the cut. The index letters are printed on canvas, the canvas appearing on both sides of the page. The index letters thus remain legible, and the pages are prevented from being torn at these points, which are necessarily subjected to the most frequent and hardest usage. By ref-

tailed memorandum regarding the goods may be kept, the whole being seen at a glance. A number of pages at the back of the book are arranged for memorandum, which will be found a great convenience. This arrangement is the result of a knowledge of the requirements of the trade in this direction, aided by suggestions from leading Hardware buyers and salesmen throughout the country. Price Book D is published in four editions at the following prices:

D, 200 pages	\$2.00
DF, 200 pages, with flap.....	2.50
D2, 400 pages.....	3.00
DF2, 400 pages, with flap.....	3.50

Business Practice.

A. F. G.

SUCCESS IS THE object of every business man, and the success of the merchant depends more upon the cordiality with which he treats his customers than perhaps any other kind of business. His time must also be at the disposal of the customer, however wasteful a use may be made of it. A gentleman attributed his lack of success in early mercantile life largely to the fact that he failed to appreciate these truths. He did not enjoy waiting upon people, but devoted his attention to keeping the store in nice condition, buying goods, and attending to the financial part of his business. He was naturally reserved in his manner, and did not exert himself to be hale fellow well met. A memorandum was kept on his desk of the

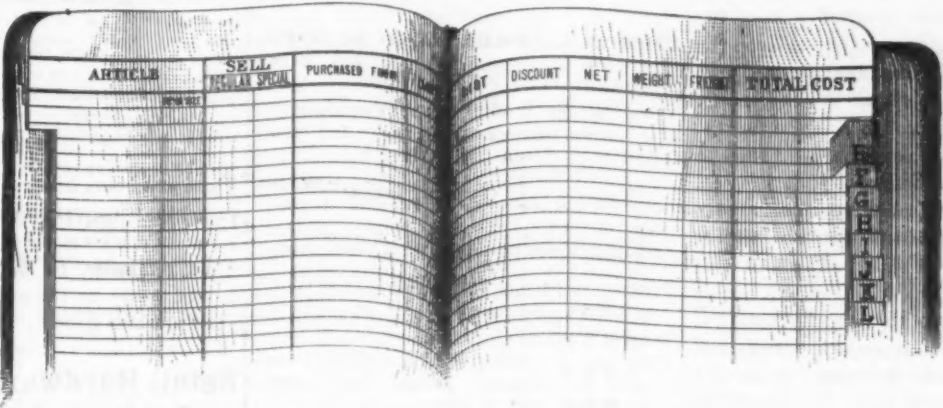


Fig. 2.—Iron Age Hardware Price Book D.

ance of the book, but greatly increases the wearing qualities of the index, as the pages, being subjected to the hardest usage at these points, soon become torn and the letters obliterated when not stayed in this manner. Each of the A, B and C Price Books is printed in four styles or editions, as shown on page 111 of this issue. Notwithstanding the marked improvements noted, as embodied in this new edition, the prices remain unchanged, being the same for either the A, B or C books, as follows:

Four Editions.

A, B or C, 200 pages.....	\$1.00
AF, BF or CF, 200 pages, with flap.....	1.25
A2, B2 or C2, 400 pages.....	1.50
AF2, BF2 or CF2, 400 pages, with flap..	1.75

Of these three Price Books B is the simplest form, having the cost arranged next to the article, followed by the selling

erence to the cut the convenient arrangement of the headings will be seen, as follows:

- Article.
- Number or Size.
- Regular Selling Price.
- Special Selling Price.
- Purchased from.
- Date of Quotation, Purchase or Invoice.
- List Price.
- Discount.
- Net Cost.
- Weight.
- Freight.
- Total Cost.

The name of the article, its number or size and the selling price are the first to meet the eye on the left-hand page, as embodying information desired when the selling price is required. The other headings follow in convenient order, by which a de-

things about the store that required attention, which were so numerous that he seldom reached the end of the list. He did not like to stop when marking goods, or arranging the show windows, or working on his books, to wait upon a customer. He was restive when obliged to listen to a long drawn out story of the difficulties experienced by a farmer with a plow; or to hear about the best cook stove ever made, which a woman had worn out by long usage, and never expected to be able to get another like it. It always seemed to him a waste of time to stand leaning against a counter, and appear to be interested in a story of uninteresting things. His idea was that if he kept his stock up and sold as low as any one, people should buy of him. He found, however, in later life, and before all his trade had left him,

that, among other things, it was necessary to spend time in talking and listening to customers talk. It came about in this way: He found something was wrong, and decided to consult a friend who was doing a successful business in an adjoining town. His friend said:

"I am very glad to have an opportunity to talk this matter over with you, and think I can locate your trouble. You do not give enough personal attention to your customers, and you want to do too much about the arranging of the goods yourself, instead of letting your clerks take part of the responsibility. I know your idea is that if you want a thing well done, do it yourself. This is all right, but what you most need is to get acquainted with your customers and have them feel at home in your store. I have heard it remarked time and again that you were straight as a string, and always sold good goods, but that people could never get acquainted with you. A large majority of the people in this world like to be coddled; to feel that special attention is being paid to them by the proprietor, and that they are getting something a little better or cheaper than any one else. While I do not believe in putting off until to-morrow what can be done to-day, I know that which cannot be done to-day can be done to-morrow or the next day. Your place and my place is near the front of the store, where we can see every customer that comes in, and if you can't wait on each personally, have a cheery word for every one, and put them in the way of getting what they want without delay. I would advise you to move your office near the front door, and get some one to keep the books for you. The money thus spent will prove the best investment you ever made. You have got to be cordial even to the disagreeable customers, and not to forget to shake hands with those who always expect it. You cannot mold people to your way of thinking in all things, nor will it do to carry an air of superiority about with you. To follow my advice you will not be obliged to give up the activity that has given your business an ambitious snap, but the activity must be differently directed."

The gentleman thanked his friend for the advice given, and concluded he could not do better than to give it a trial. The office was moved to the front of the store, a young man found to assist on the books and to do the collecting; the charge of the stock was divided among the clerks, and his time was devoted to becoming acquainted with his customers, and to seeing that they were promptly and properly waited upon. This change in his business practice resulted as his friend had supposed it would. It only required the addition of the social qualities to his otherwise correct business principles to make a success of his business.

Pointers for Salesmen.

THERE IS LITTLE doubt that more sales could be made by salesmen in retail stores if they were familiar enough with the goods that they sell to bring the strong and desirable points prominently

before the customer. Or the clerk may have heard the traveling salesman expatiating on the good qualities of the goods at the time the order was given, and have forgotten half that was told before a customer calls for the goods under discussion. A Shovel, for instance, is simply a Shovel to many a man when he is trying to sell it. Should the price be higher than the customer could buy one apparently as good at another store, and the salesman could not make any other explanation why it should cost more, except that "it is marked higher" the sale would not be made.

These remarks are suggested by a card which has recently been issued by the H. M. Myers Company, Beaver Falls, Pa. It is furnished with a metallic eyelet for hanging, and on one side contains instructions to salesmen, describing the company's patent one-piece solid-steel Shovel, while the other side serves as a price card of the company's Shovels, Spades and Scoops, arranged for recording the cost price and retail and wholesale selling prices. In order to make clear the arrangement of the card we reproduce it in full, convinced that it will be suggestive to manufacturers and merchants in regard to the matter of giving pointers for salesmen, while at the same time it illustrates enterprise and ingenuity in furnishing matter which will be appreciated by retailers. The price card side is as follows:

COST AND SELLING PRICE,
WHOLESALE AND RETAIL,
—OF—
SHOVELS, SPADES AND SCOOPS.
COMPLIMENTS
THE H. M. MYERS COMPANY,
BEAVER FALLS, PA.

Name.	Cost.		Retail.		Whole-sale.
	Shovels.	Size	Doz.	Each	Dozen.
D H S P	2				
D H R P	2				
L H R P	2				
L H S P	2				
Spades, D. H.	2				
" L. H.	2				
Coal.	1				
"	2				
"	3				
"	4				
Scoops, P'gh.	1				
"	2				
"	3				
"	4				
" Easton.	2				
"	3				
"	4				
"	5				
"	6				
"	7				
"	8				
"	9				
"	10				

On the reverse side of the card they point out the desirable features of their goods for the benefit of the salesman, as follows:

OVER.
OFFICE OF
THE H. M. MYERS COMPANY,
BEAVER FALLS, PA.
INSTRUCTIVE TO SALESMEN.
READ IT.

The following points of superiority claimed for our **Patented One-Piece Solid Steel Shovel**, with the Myers Patent Socket Strap, will, if well understood, assist you materially in their sale:

First.—The THICK CENTER or GRADUATION of the Blade, as shown in the section, commends itself to all practical men, and too much cannot be said of this feature, as the increasing thickness in the center, running from the point to the top, compensates for the wearing away of the back of the Shovel when used, thus making the tool wear away evenly, and retain its perfect shape until it is worn completely out. This feature cannot be found in any other similar make of Shovels.

Second.—We would call your particular attention to the extreme SMOOTHNESS of our BLACK UNPOLISHED WORK, which is just as smooth as the Bright Blades. Consequently, would earnestly recommend the Black Shovel—as made by us—as being superior, in the way of service, as the Black Enamel finish is so hard that it can only be removed by the aid of Acids and an Emery Wheel afterwards.

Third.—The Blade and Straps of our SOLID STEEL goods are from *One Solid Piece of Steel* without a weld or rivet in any way, constituting the highest form known to the Art of Shovel Making, and producing what has long been sought after—A PERFECT PLAIN BACK TOOL.

Fourth.—WORKMANSHIP and FINISH unequalled, our aim being in this direction to be EQUALED BY NONE.

Fifth.—It being constructed theoretically to give the UTMOST SERVICE POSSIBLE for a tool of its kind, it will practically prove that the theory is correct in every particular.

Sixth.—Every Blade is CAREFULLY TEMPERED—thereby differing substantially from any other make of similar Tools.

For sale by

This card being hung near the Shovel rack presents a convenient and comprehensive form for marking prices, and also is a constant reminder to the salesman of the points made by the manufacturers in regard to their goods.

Retail Hardware and Stove Dealers' Association.

THE RETAIL HARDWARE AND STOVE DEALERS' ASSOCIATION of New York and Vicinity will hold a meeting on Wednesday, June 10, 8 p.m., at Retail Grocers' Hall, 213 East Twenty-third street, New York. All members of the association and all dealers who have not joined, yet sympathize with the object of the association, are requested to attend this meeting. Important business will be taken up, and the question of a permanent place for holding the meetings of the association will be considered.

H. M. Curry, vice-chairman of Carnegie, Phipps & Co., Limited, and J. G. A. Leishman, vice-chairman and treasurer of Carnegie Bros. & Co., Limited, of Pittsburgh, sailed for Europe last week on a pleasure and business trip, and will be absent for about six weeks.

Exports.

PER BARK LURLINE, MAY 18, 1891, FOR PORT ELIZABETH, SOUTH AFRICA.

By Arkell & Douglas.—400 reels Barb Wire, 2 Hoisting Engines, 39 packages Windmills, 1 case Can Openers, 2 kegs Horse Shoes, 10 cases Sash Weights, 2 bundles Cordage, 1 case Hardware, 1 dozen Cages, 6 reams Sandpaper, 13 packages Lampware, 9½ dozen Drills, 1 dozen Forks, 5 packages Stoves, 5 dozen Traps, 1 case Tacks, 2 Scrapers, 1 Harrow, 6 dozen Saws, 20 dozen Picks, 40 kegs Nails, 12 Shellers, 3 dozen Hoes, 1 case Locks, 6 gross Locks, 19 cases Axes and Hatchets, 67 cases Flows and Fixtures, 17 Shellers, 1 case Hardware, 15 Pumps, 20 dozen Picks, 12 dozen Forks, 1 case Hardware.

By Coombs, Crosby & Eddy.—1 Road Grader, 36 cases Sash Weights and Cord, 127 dozen Edge Tools, 3 gross Polish, 25 kegs Nails, 200 Plow Beams, 53 dozen Carpenters' Tools, 1 dozen Wheelbarrows, 1 dozen Choppers, 1 dozen Sad Irons.

FOR CAPE TOWN.

By Coombs, Crosby & Eddy.—9 dozen Edge Tools, 3 crates Churns, 2½ dozen Carpenters' Tools, 2 dozen Fly Traps, 12 dozen Hatchets, 18 Scales, 3 racks Churns.

By the Johnson Harvester Company.—671 packages Mowing Machines.

By Arkell & Douglas.—43 dozen Axes, 12 Washers, 6½ dozen Choppers, 5 packages Hand Carts, 12 dozen Traps, 2 dozen Ladders, 9 Pumps, 2 dozen stuffers.

PER BARK HARRIET S. JACKSON, MAY 22, 1891, FOR EAST LONDON, SOUTH AFRICA.

By W. H. Crossman & Bro.—71 Stoves, 1 cask Pumps, 238 cases Hardware, 3 bales Sash Cord, 33 cases Sash Weights, 88 Scales, 54 Churns, 12 dozen Twine, 2 dozen Stoves, 3 cases Bird Cages, 800 reels Barb Wire, 12 Stoves, 1185 packages Agricultural Implements, 30 Ladders, 1 gross Traps, 9 Washing Machines, 80 kegs Nails, 1 case Hammers, 419 pounds Manila Rope.

PER BARK COLDINGHAM, MAY 22, 1891, FOR SYDNEY, N. S. W.

By W. K. Freeman.—8 cases Hardware.

By Healy & Earl.—1 case Forges, 1 case Saws, 1 case Hardware, 1 box Screw Cutters.

By Winchester Repeating Arms Company.—30 Guns, 10,000 Cartridges.

By Fairbanks & Co.—7 boxes Scales.

By A. Field & Son.—74 boxes Iron Nails.

By W. & B. Douglas.—2 boxes Pumps.

By Hartley & Graham.—39,000 Cartridges.

By McCoy & Sanders.—6 dozen Hardware, 3 barrels Blocks.

By L. P. Rose & Co.—15 packages Plated Ware.

By Fairpoint Mfg. Company.—4 casks and 1 barrel Silver Plated Ware.

By R. W. Forbes & Son.—9 cases Hardware, 21 Horse Hoes, 8 case Pumps.

By the F. B. Wheeler Company.—5 cases Hardware, 1 case Bird Cages, 9 cases Axes, 5 cases Wire Goods, 1 cases Axes.

By H. W. Peabody & Co.—1 case Traps, 3 packages Wheelbarrows, 6 cases Hardware, 2 cases Axes, 1 case Graters, 1 case Hardware, 2 cases Lamp Goods, 1 case Pumps, 4 dozen Tools, 1 crate Oil Stones, 7 cases and 2 packages Hardware, 4 cases Axes, 3 cases Hardware, 1 case Wire Goods, 33 packages Stoves, 300 pounds Nails, 1 case Hardware, 1 gross Egg Beaters, 1 case Chalk Lines, 1 package Stoves, 1 package Hardware, 400 reels Barb Wire, 200 reels Barb Wire.

By A. S. Lascelles & Co.—12 gross Pencils, 6 cases Hardware, 4½ dozen Meat Choppers, 6 cases Scales, 1 package Hardware, 1 case Egg Beaters, 6 dozen Locks, 80 cases Axes, 5 cases Hardware, 2 cases Fire Arms, 1 case Tools, 6 cases Cartridges, 30 cases Hardware, 14 dozen Wrenches, 1 case Fire Arms, 1 dozen Axes, 1 case Thermometers, 2 dozen Wrenches.

By Strong & Trowbridge.—12 cases Lampware, 6 Stoves, 4 cases Nails, 1 case Forks, 1 case Hammers, 3 cases Pumps, 20 cases Axes, 1 case Braces.

By W. H. Crossman & Bro.—12 cases Hardware, 1 case Traps, 25 dozen Cutlery, 1 case Axes, 1 dozen Cultivators, 2 cases Hardware, 1 case Tills, 2 cases Hardware, 1 case Egg Beaters, 20 gross Fruit Jars, 3 dozen Tills, 1 dozen Wringers, 6 dozen Scales, 1 box Shears, 1 gross Hardware.

By R. W. Cameron & Co.—12 dozen Lampware, 2 cases Lamps, 12 Oilers, 5 Blowers, 5 boxes Hardware.

The Société d'Encouragement pour l'Industrie Nationale of Paris has awarded a prize of 2500 francs to Henry M. Howe, Boston, Mass., on account of his treatise on the metallurgy of steel.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

In this line the only feature of special importance is uncertainty as to future prices for various lines of Paints and Oil Colors, due to the sharp reduction in price of Linseed Oil made on Thursday of last week. Some manufacturers assert that prices for their goods have all along been based upon much lower prices for Oil than those now ruling, and that revisions, if any, in the near future, will be moderate. In other quarters it is admitted that more or less reduction in prices will be made in due season, should the fall in Oil prove to be permanent. For the time being buyers are very cautious in their operations in the several lines of goods thus affected, and the movement in other varieties is of merely commonplace character.

White Lead.—The housesmith's strike and incidental labor troubles restrict building operations in this vicinity more or less, and thereby check the consumption of White Lead and other pigments. To this extent the market is less satisfactory, but the embargo upon local consumption is partly offset by a good, steady run of out-of-town orders. The decline in the price of Linseed Oil naturally leads to expectations of some reduction ere long in quotations for Lead in Oil. The probabilities are that the opportunity afforded manufacturers of inferior pigment containing but a small percentage of Lead to put their goods in at lower prices without any sacrifice of profits will be taken advantage of. Whether manufacturers of the better class of mixtures will make any concession depends in a good measure upon what corrodors do, and the corrodors, it is unnecessary to remark, give no idea of their intentions prior to official announcement of prices. Jobbers, it is stated, are freer in shading the corrodors' list, but they do not appear to make deeper cuts than formerly in that pigment or the better class of mixtures.

Zincs.—The position of the market for American Oxide remains very strong. There is hardly the pressure of orders that was experienced a month ago, but the outlet seems still to be sufficient to absorb the entire production and friendly relation between manufacturers are maintained. Prices are no higher, but decidedly firm on all grades. Foreign brands are selling with a fair degree of freedom. List prices are occasionally shaded a trifle by some jobbers, but, taken as a whole, the market retains a firm tone and current importations are sold up closely.

Colors.—In the more staple varieties of Dry Colors adapted to grinders' use there continues to be a good movement and prices remain quite steady throughout. House-painters' specialties and Oil Colors have been rather slow, however, but specialties in that line and in the finer class of Mixed Paints are faring remarkably well.

Miscellaneous.—Block Chalk has been sold on the spot at \$3 @ \$3.25, some consumers finding it necessary to buy from competitors owing to non-arrival of stock purchased some time ago in the foreign markets. Future shipments can be secured at \$2.50, possibly at a shade less. Whiting continues to meet with free sale, but at previous low prices. Paris White is steady. Clays of all descriptions are quoted as heretofore, with fair movement.

Oils and Turpentine.

The various branches of the Oil market, Linseed excepted, have been dull and uninteresting throughout the week. Home

trade buying all along the line has been of strictly routine character, exporters' limits on price have been kept at a point that held operations for foreign account down to narrow proportions, and, while inclined to consider good offers on a somewhat lower level of values in several instances, sellers have done very little that would afford grounds for suspicion of unusual anxiety to sell. The decline of 5¢ @ gallon in the price of Linseed Oil, as a matter of fact, is the only really important change to go on record, and that one is an outcome of purely exceptional circumstances, in which other Oils are not involved to the slightest extent.

Linseed Oil.—City crushers have reduced their prices to 52¢ @ gallon for domestic and 60¢ for Calcutta seed product. Those outside crushers who are endeavoring to perfect a general combination have acted in harmony with the local firms and dropped their price to 50¢ for New York delivery. In explanation of this movement the statement is volunteered that a fall in the cost of raw material warranted a cut of 5¢ @ gallon. While this may be true in a certain degree, there is strong circumstantial evidence in support of the idea that a drive at those Western crushers who made agreements and immediately broke them is being made, and there are some indications also that the contest will be continued until the aggressive parties accomplish their object, or withdraw, satisfied that the opposition is long-lived. Since the reduction in prices alluded to above was made, out-of-town competition has moderated somewhat, yet the 50¢ rate is said to have been shaded at least 1¢, and in some quarters it is intimated that buyers have been requested to make offers of 48¢, New York delivery, for shipment during the next 60 days.

Cotton-Seed Oil.—In this line there has been no change whatever. Exporters refuse to raise their limits to the slightest extent, and, while modifying their ideas of value somewhat, holders do not come down to the point at which business of any magnitude can be put through. Home trade demand, meanwhile, is slow, and the only redeeming feature is that supplies here are under very fair control.

Lard Oil.—The best city brands are now offered at 53¢ @ 54¢ and outside brands at as low as 52¢. This modification of cost has served to stimulate buying to a moderate extent, but the movement is not up to the full average volume, operations of large buyers being restricted more or less by the uncertainty as to the course of the market for raw material.

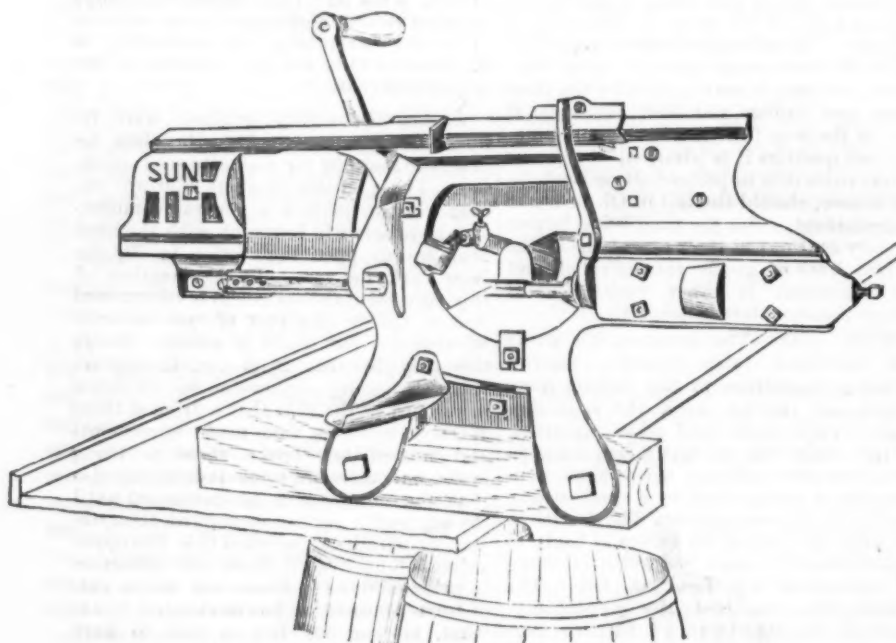
Fish Oils.—The menhaden fishing in Southern waters has been comparatively small thus far, and few fish have been taken in Long Island Sound. Late purchases cleaned up nearly the entire supply of crude Oil from first hands, and, pending results of the new season's work, business is practically at a standstill. In crude Whale and Sperm Oils no movement has taken place. The manufactured products are selling in the usual way and at old prices.

Miscellaneous.—Olive Oil, in barrels, is freely offered at the lower prices reached last week, but cost seems to have little bearing at present, and business is of strictly routine character. Coconut Oil, out of store, is selling rather slowly and at old prices, but lots to arrive are offered at irregular rates.

Spirits Turpentine.—Prices advanced during the week about ¼¢ @ gallon under the influence of favorable Southern advices and reduction in stocks here. Subsequent anxiety to realize in the Southern markets turned the tide, however, and prices receded to about where they stood a week ago.

Sun Parer and Corer.

C. M. Heffron, Rochester, N. Y., is offering the trade a paring and coring machine, as illustrated herewith. The parer is designed to do the work rapidly, with the least possible amount of exertion on the part of the operator. The barrel to the left is to receive the cores, while the one on the right is for the parings, the



Sun Parer and Corer.

apples being left on the trimming table. It is claimed that it will pare as fast as the operator can pick up the apples and put them on the fork. Some idea can be formed from this as to the quantity that it will pare in a day. The point is made that the machine is durable in construction, allowing it to be run during the evaporating season without requiring repairs.

Never-Break Scotch Bowl.

The Bronson Supply Company, Cleveland, Ohio, and 73 Beekman street, New York, are introducing a Scotch bowl, as illustrated herewith. This is referred to as a new form in their line of wrought-steel cooking utensils. It is claimed that it will not absorb grease, will not scale, will never break, and that it is very finely polished inside, is always clean, sweet



Never-Break Scotch Bowl.

and nice. They are made in Nos. 7, 8 and 9, with a capacity of 5, 6 and 8 quarts, respectively. We are pleased to state in this connection that the Never-break goods have been recently adopted by some of the departments in both the United States army and navy, and also by the Indian Commissioner, showing the esteem in which they are held.

Pressure Clean Out and Pipe Closer.

Theo. Michel & Co., 747 Wabasha street, St. Paul, Minn., manufacture O'Brien's Patent Pressure Clean Out and Pipe Closer; also the Hercules Adjustable Pipe Closer, views of which are presented in the accompanying engravings. Fig. 1 shows the O'Brien closer, the advantages of which, as mentioned by the manufacturers, are

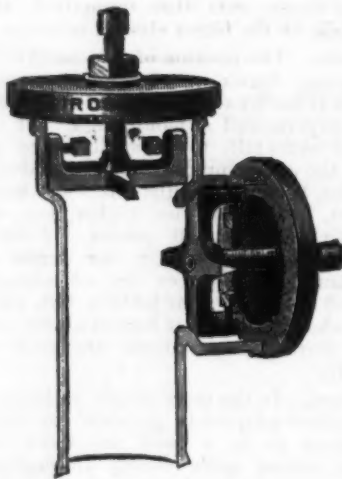


Fig. 1.—O'Brien's Pressure Clean Out and Pipe Closer.

may be intended for future use. It is pointed out that the only tools necessary to put it on are a pair of pliers and a monkey wrench, and that no lead or calking is required. There are no threads to strip, and when the clean out is removed it gives a full opening to the pipe. The construction of the plug is very simple, as can be seen by reference to the illustration, Fig. 1. The set screws at the side are cup pointed, and it is said that a small pliers will tighten them enough to prevent the brace slipping when the lock nut on top is screwed down. The ring below the cap is made of the best gum rubber, giving

ing a perfect fit, irrespective of the roughness of the iron pipe. The manufacturers state that these plugs will stand over 50 pounds' pressure to the square inch without leaking air or water. Fig. 2 shows the Hercules Adjustable Pipe Closer. This

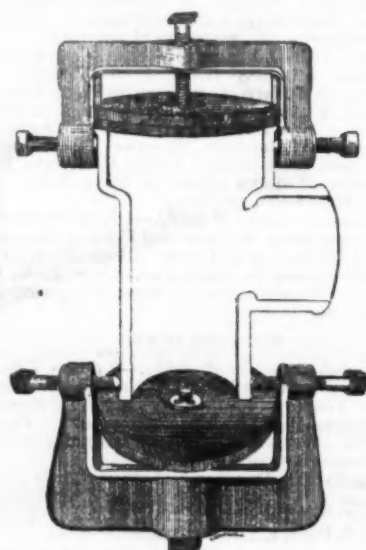


Fig. 2.—The Hercules Adjustable Pipe Closer.

consists of a yoke of iron with set screws at the side, while in the middle is a plate that is raised or lowered by means of a screw-threaded bolt passing through the center of the yoke. The set screws being adjustable permit the pipe closer to be used either on the hub or spigot end of a soil pipe, and furthermore it will fit any size of pipe from 2 to 6 inches in diameter. The pipe closer, it is said, will resist any pressure of air or water.

Granite Iron Ware Baking Dish.

The St. Louis Stamping Company, St. Louis, Mo., are placing on the market a very handsome culinary utensil, the special features of which are shown in the annexed illustration. It is a baking dish made of granite iron ware, the dish being the middle article shown in the cut. With



Granite Iron Ware Baking Dish, with Nickel Receptacle.

it is a nickel receptacle and likewise a ring, fitting over the edge and giving a very neat appearance to the dish. The Granite Iron Ware Baking Dish is white enameled within and dark blue on the outside, and fits closely into the stamped receptacle, the latter being handsomely finished in nickel plate and provided with cast handles. The dishes are made in three sizes, known as Nos. 102, 103 and 103½, and hold respectively 4, 6 and 7 pints.

Charles H. Besly & Co., 175 to 177 Lake street, Chicago, have just put on the market a very convenient pocket wire gauge, in circular form, marking from No. 5 down to 36. It is made of polished steel which has been oiled and baked, thus giving it a permanent dark color and rendering it rust proof.

The Sun Slicer.

C. M. Heffron, Rochester, N. Y., is offering the trade an apple slicer, as illustrated herewith. The slicer in appearance is somewhat different from others on the market, but we are advised that only a trial

The points of excellence claimed for these scoops are that they are light, the scoop casting of No. 1 weighing only 4 pounds, and that of No. 2, 5 pounds; also that they are strong. As a proof of the last claim the manufacturers suggest that a man be lifted while standing in the scoop, and



The Sun Slicer.

is needed as conclusive evidence of its practical utility. It was designed so that in operating the hands would follow natural motions, thus doing the greatest amount of work with the least amount of labor. It is claimed that it slices rapidly, and that considering the cost of labor and the quantity of work, it recommends itself to the user. It is stated that the slicing is done in such a manner that much time is gained in drying the apples.

Little Giant Potato and Corn Scoop.

Bissell & Thornhill, Milford, Mich., are offering the trade a malleable scoop, as illustrated in Figs. 1 and 2. The scoop proper is made in one piece and of malleable iron, and the manufacturers claim

they warrant that the scoop will not bend or break with his weight. These scoops are being sold throughout the United States and Canada, being distributed by



Fig. 2.—Reverse View of Little Giant Scoop.

jobbers at convenient points over the territory which they control.

Adam W. Spies, a retired hardware merchant, died at his home, 50 East Twenty-fourth street, New York, on the 31st ult., of extreme old age. Mr. Spies was born in New York, September 4, 1800, and was educated in various private schools. At the age of 17 he was apprenticed to a hardware merchant and gunsmith, which business he followed until his retirement in 1850. In 1835 he was a member of the firm of Wolf, Spies & Clark, whose place of business was in Pearl street. At a later period he organized the firm of Adam W. Spies & Co. on Broadway, from which he subsequently retired to assume the presidency of an insurance company. After serving in this capacity for several years he retired to private life.

The spoke factory of the Gibson-Moore Mfg. Company, Aberdeen, Miss., now holds the record for quick spoke making. C. E. Klaer, the superintendent, says he has an operator by the name of John Mollon, who has surpassed all records for fast work—turning out in one week of 58 hours 13,735 spokes. His best day of ten hours was 2695 spokes, thus outstripping all previous fast-day records. The lathe on which this work was done is the well-known Egan Company's, Cincinnati, Ohio, improved automatic spoke lathe.

The wage committees of the Amalgamated Association of Iron and Steel Work-

ers commenced their session in Pittsburgh last week, and have already formulated a new scale, which is to go into effect on July 1 for one year. As far as can be learned, none but minor changes have been made in the new scale.

The claim of the aqueduct contractors, O'Brien & Clark, to recover over \$730,000 for extra work came before Judge Ingraham, who decided that they are entitled to no compensation beyond the amount specified in the contract.

Hiram Maxim, the inventor of the famous gun which bears his name, delivered a lecture and displayed his weapon before the Electrical Club. He fired 49 shots more rapidly than they could be counted or timed, and fired two so rapidly that a single report was heard. The best record thus far is 1001 shots from a 04 pound gun in one and one-half minutes.

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Prices, Trade Items, Trade Topics, McCoy	
& Sanders, Hardware Association, Price-	
Lists, Circulars, &c., It Is Reported—, Orr	
& Lockett Hardware Company's Cata-	
logue, Iron Age Hardware Price Books—	
Illustrated, Business Practice, Pointers for	
Salesmen, Retail Hardware and Stove	
Dealers' Association, Exports, Paints and	
Colors.....	1090-1097
Sun Parer and Corer. Illustrated ..	1098
Never-Break Scotch Bowl. Illustrated	1098
Pressure Clean Out and Pipe Closer. Illus....	1098
Granite Iron Ware Baking Dish. Illus.....	1098
The Sun Slicer. Illustrated.....	1099
Little Giant Potato and Corn Scoop. Illus....	1099
The Parcels Post.....	1099
Current Hardware Prices.....	1100-1105
Current Metal Prices.....	1106



Fig. 1.—Little Giant Scoop.

that any time in the scoop can be bent up in the shape of a watch spring without breaking. The scoops are made in two sizes, No. 1 and No. 2. An idea of their capacity can be formed from the statement that a bushel basket can be more than filled with four No. 1 scoops full of potatoes, and that the No. 2 is much larger.

CURRENT HARDWARE PRICES.

JUNE 3, 1891.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers' name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers, at the figures named.

Adjusters, Blind.

Domestic..... \$ dos \$3.00, 33¢
 Excelsior..... \$ dos \$10.00, 50¢10¢
 Washburn's Self-Locking..... 80¢10¢10¢

Ammunition.—

Caps, Percussion, 1000—
 Sicks & Goldmark's and Union Metallic
 Cartridge Co.
 F. L. Waterproof, 1-10's..... 34¢35¢
 E. B. Trimmed Edge, 1-10's..... 46¢48¢
 E. B. Grnd. Edge, Cent. Fire, 1-10's..... 46¢47¢
 Masket Waterproof, 1-10's..... 50¢
 G. D..... 28¢
 A. B. Genuine Imported..... 45¢
 Eley's E. B..... 54¢ 57¢
 Eley's D Waterproof, Central Fire..... \$1.00

Cartridges—

Rim Fire Cartridges..... 50¢52¢
 Rim Fire Military..... 15¢21¢
 Cent. Fire, Pistol and Rifle..... 25¢52¢
 Cent. Fire, Military and Sporting..... 15¢52¢
 Blank Cartridges, except 22 and 32 cal.,
 additional 10 % on above discounts.
 Blank Cartridges, 22 cal., \$1.75..... 2 %
 Blank Cartridges, 32 cal., \$3.50..... 2 %
 Primed Shells and Bullets..... 15¢52¢
 B. B. Caps, Round Ball, \$1.75..... 2 %
 B. B. Caps, Con. Ball, Swgd., \$3.00..... 2 %

Primers—

Berdan Primers, \$1.00..... 2 %
 B. L. Caps (for Sturtevant Shells) \$1.00..... 2 %
 All other Primers, \$1.30..... 2 %

Shells—

First quality 4, 8, 10 and 12 gauge..... 25¢10¢2 %
 First quality, 14, 16 and 20 gauge (\$10
 list)..... 30¢10¢2 %
 Prime, Star, Club, Rival and Climax brands..... 38¢10¢2 %
 Selbold's Comb. Shot Shells..... 15¢2 %
 Brass Shot Shells, 1st quality..... 60¢2 %
 Brass Shot Shells, Club, Rival, Climax..... 65¢2 %

Shells Loaded—

Standard List, July 10, 1890..... 40¢10 %
 Wads—Price per M.
 U.M.C. & W. R. A.—B. E., 11 up..... 68¢
 U.M.C. & W. R. A.—B. E., 9, 10, 11..... 82¢
 U.M.C. & W. R. A.—B. E., 8..... 96¢
 U.M.C. & W. R. A.—B. E., 7..... 110¢
 U.M.C. & W. R. A.—P. E., 11 up..... 1.15
 U.M.C. & W. R. A.—P. E., 9, 10, 11..... 1.50
 U.M.C. & W. R. A.—P. E., 8..... 1.70
 U.M.C. & W. R. A.—P. E., 7..... 1.80
 Eley's B. E., 11 up..... \$1.75
 Eley's P. E., 11 up..... 2.80

Anvils.—

Eagle Anvils, 10¢..... 15¢15¢2 %
 Peter Wright's..... 11¢11¢4 %
 Armistage's House Hole..... 10¢41¢
 Armistage's House Hole, Extra..... 12¢12¢4 %
 Trenton..... 10¢10¢4 %
 Wilkinson's..... 10¢10¢11¢
 Moore & Barnes Mfg. Co..... 33¢4 %

Anvil Vise and Drill—

Millers Falls Co., \$18.00..... 20 %
 Cheney Anvil and Vise..... 25 %
 Allen Anvil and Vise, \$3.00..... 40¢10 %
 Star..... 45¢5 %

Apple Parers—See Parers, Apple.

Augers and Bits—

Douglas Mfg. Co..... 70¢10 %
 Wm. A. Ives & Co..... 70¢10 %
 Humphreysville Mfg. Co..... 70¢10 %
 French, Swift & Co. (F. H. Beecher)..... 70¢10 %
 P. S. & W. Co..... 70¢10 %
 Rockford Bit Company..... 65 %
 Cook's, Douglas Mfg. Co..... 65 %
 Cook's, N. H. Copper Co. 50¢10¢10¢5 %
 Ives' Circular Lip..... 60 %
 Patent Solid Head..... 80 %
 C. E. Jennings & Co., No. 10, extension
 up..... 60 %
 C. E. Jennings & Co., No. 30..... 60 %
 C. E. Jennings & Co., Auger Bits, 1 set,
 32 1/2 quarters, No. 5, \$5; No. 30, \$3.50, 20 %
 Lewis' Patent Single Twist..... 45 %
 Russell Jennings' Augers and Bits 25¢10 %
 Imitation Jennings Bits..... 60¢60¢5 %
 Snell's Jennings Pattern..... 80 %
 Pugh's Black..... 80 %
 Rockford, Jennings' Pattern..... 60 %
 Car Bits..... 60¢60¢10 %
 Car Bits, P. S. & W. Co..... 60¢10 %
 L. Hommedieu's Car Bits..... 15¢10 %
 Fortner's Pat. Auger Bits..... 20 %
 Cincinnati Bell-Hangers' Bits..... 30¢10 %

Bit Stock Drills—

Morse Twist Drills..... 50¢10¢5 %
 Standard..... 50¢10¢5 %
 Cleveland..... 50¢10¢5 %
 Syracuse, for metal..... 50¢10 %
 Syracuse, for wood (wood list) 30¢10 %
 Williams' or Holt's, for metal 50¢10 %
 Williams' or Holt's, for wood..... 40¢10 %
 Cincinnati, for wood..... 30¢10 %
 Cincinnati, for metal..... 45¢10 %

Expansive Bits—

Clark's small, \$1.18; large, \$2.67 35¢35¢5 %
 Ives' No. 4, \$ dos \$60..... 40 %
 Swan's, No. 1, \$2.25; No. 2, \$2.25..... 35 %
 Stearns' No. 2, \$48..... 20 %

Gimlet Bits—

Common..... \$ gross \$2.75 \$3.25
 Diamond..... \$ dos \$1.10..... 25¢10 %
 See..... 35¢25¢5 %
 Double Cut, Shepardson's..... 45¢45¢10 %

Double Cut, Ct. Valley Mfg. Co..... 30¢10 %
 Double Cut, Hartwell's, \$ gro..... 45¢25
 Double Cut, Douglass'..... 40¢10 %
 Double Cut, Ives'..... 60¢60¢10 %
 Hollow Augers—
 Ives..... 33¢4 %
 French, Swift & Co..... 33¢10 %
 Douglas..... 33¢10 %
 Bonney's Adjustable, \$ dos \$48..... 40¢10 %
 Stearns'..... 30¢10 %
 Ives' Expansive, each \$4.50..... 60¢25 %
 Universal Expansive, each \$4.50..... 20 %
 Wood's..... 25¢25¢10 %
 Cincinnati Adjustable..... 25¢10 %
 Cincinnati Standard..... 25¢10 %
 Ship Augers and Bits—
 L'Hommedieu's..... 15¢10¢15¢10¢2 %
 Watrous'..... 15¢10¢15¢10¢10 %
 Snell's..... 15¢10¢15¢10¢2 %
 Snell's Ship Auger Pat'n Car Bits..... 15¢10¢15¢10¢3 %

Awl Hafts—See Hafts, Awl.

Awls, Brad Sets, &c—
 Awls, Sewing, Common \$ gr \$1.70, 35 %
 Awls, Should, Peg, \$ gr \$2.45, 40¢40¢10 %
 Awls, Fat, Peg, \$ gr \$3.45, 40¢40¢10 %
 Awls, Shouldered Brad, 2.70 \$ gr..... 35 %
 Awls, Handled Brad, \$7.50 \$ gr..... 45 %
 Awls, Handled Scratch \$ gr, \$7.50, 35¢10 %
 Awls, Socket Scratch, \$ dos, \$1.50, 25¢30 %

Awl and Teel Sets—See Sets, Awl and Tool.

Axes—
 First quality, best brands, \$7.00 @ \$7.50
 First qual., other brands..... 6.62 1/2 @
 Second quality..... 6.10 6.54
 Axle Grease—See Grease, Axle.

Axles—
 No. 1, 4¢ @ 5¢, No. 2, 5¢ @ 6¢
 Nos. 7 to 14..... 55¢5 %
 Nos. 15 to 18..... 47 %
 Nos. 19 to 22..... 70 %
 Concord Axles, loose collar..... 50¢6 %
 Concord Axles, solid collar..... 65¢7 %
 National Tubular Self-Oiling..... 35¢43¢3 %

Bag Holders.—See Holders, Bag.

Balances—

Spring Balances..... 40 %
 Chatillon, \$ dos..... \$0.80 0.95 1.75 net
 Chatillon Straight Balances..... 40 %
 Chatillon Circular Balances..... 50¢10 %

Bars.—

Crow—
 Cast Steel..... \$ 3 3/4
 Iron, Steel Points..... \$ 3 3/4
 Basins, Wash—
 Standard Fiberglass, No. 1, 10¢-inch, \$3;
 12-inch, \$3.25; 13 1/2-inch, \$2.75; 15-inch,
 \$3.25.

Beams, Scale—

Scale Beams, List Jan. 12, '83..... 50¢10 %
 Chatillon's No. 1..... 50¢10¢5 %
 Chatillon's No. 2..... 50 %
 Custer's..... 33¢4 %

Beaters—

Egg—
 Dover..... \$ dos \$1.50
 Duplex (Standard Co.)..... \$ dos \$1.35
 Rival (Standard Co.)..... \$ dos \$1.00
 Duplex Extra Heavy (Standard Co.)..... \$ dos \$2.00

Bells—

Common Wrought..... 60¢10 %
 Western..... 30¢10 %
 Western, Sargent's list..... 70¢10 %
 Kentucky, "Star"..... 20¢10 %
 Kentucky, Sargent's list..... 70¢10 %
 Kentucky, Durham..... 70¢10 %
 Dodge, Genuine Kentucky..... 70¢70¢10 %
 Texas Star..... 50¢10¢60¢5 %
 Call..... 40¢40¢5 %
 Farm Bells..... \$ 3 3/4
 Steel Alloy Church and School Bells..... 40 %

Doors—

Gong, Abbe's..... 35¢4 %
 Gong, Yankee..... 45¢10 %
 Gong, Easton's..... 25¢10 %
 Crank, Taylor's..... 50¢10 %
 Crank Brooks'..... 50¢10 %
 Crank Cone's..... 20¢10 %
 Crank, Connell's..... 20¢10 %
 Lever, Sargent's..... 60¢10 %
 Lever, Taylor's Bronzed or Plated..... net
 Lever, Taylor's Japanned..... 25¢10 %
 Lever, R. E. M. Co.'s..... 50¢10 %
 Pull, Brook's..... 50¢10 %
 Pull, Western..... 25¢10 %

Electric—

Wollensak's..... 20 %
 Bigelow & Dowse..... 20 %
 Taylor..... 20 %

Hand—

Light Brass..... 75¢10 %
 Extra Heavy..... 65¢10 %
 White Metal..... 60¢10 %
 Silver Chime..... 35¢4 %
 Globe Cone's Patent..... 55¢70¢3 %

Hammers—

Blacksmith's..... 60¢5 %
 Molders'..... 40¢40¢10 %
 Hand Bellows..... 40¢10 %

Belting, Rubber—

Common Standard..... 70¢70¢5 %
 Standard..... 80¢10¢10 %
 Extra..... 50¢10¢60 %
 N.Y.B. & P. Co., Carbon..... 50 %
 N.Y.B. & P. Co., Diamond..... 40 %
 N.Y.B. & P. Co., Para..... 40 %

Bench Stops—See Stops, Bench.

Benders, Upsetters, Tire.

Stoddard's Lightning Tire Upsetters..... 15 %
 Detroit Perfected Tire Bender..... 15 %

Bits—

Auger, Gimlet, Bit Stock, Drills, &c.,
 see Augers and Bits.

Bit Holders—See Holders, Bit.

Blind Adjusters—See Adjusters, Blind.

Blind Fasteners—See Fasteners, Blind.

Blind Staples—See Staples, Blind.

Blocks—

Ordinary Tackle, list May 30, 1889..... 60¢10¢10 %
 Cleveland Block Co., Mal. Iron..... 50 %
 Moore's Novelty, Mal. Iron..... 50 %
 Sure Grip Steel Tackle Blocks..... 25 %

Boards, Stove.

Wood Lined "Crystal"..... 50 %
 "Embossed"..... 50 %
 "Oxidized"..... 45 %
 Paper Lined Zinc..... 55 %
 "Crystal"..... 55 %
 "Embossed"..... 55 %
 "Oxidized"..... 45 %

Bolts—

Carriage, Machine, &c.—
 Com. list June 10, '84..... 75¢10¢2 %
 Genuine Eagle, list Oct. '84..... 75¢10¢80 %
 Phila. pattern, list Oct. 7, '84..... 80¢80 %
 R.B. & W., old list..... 70 %
 Machine, list Jan. 1, 1890..... 75¢10¢75¢10¢2 %
 Bolt Ends, list Jan. 1, 1890..... 75¢10¢75¢10¢2 %

Door and Shutter.

Cast Iron Barrel, Square, &c. 70¢70¢10 %
 Cast Iron Shutter Bolts..... 70¢70¢10 %
 Cast Iron Chain (Sargent's list)..... 65¢10 %
 Ives' Patent Door Bolts..... 60 %
 Wrought Barrel..... 70¢70¢10 %
 Wrought Square..... 70¢70¢10 %
 Wrt Shutter, all Iron, Stanley's..... 60¢10 %
 Wrt Shutter, Brass Knob..... 40¢10 %
 Wrt Shutter, Sargent's list..... 60¢10 %
 Wrt Sunk Flush, Sargent's list..... 55¢10 %
 Wrt Sunk Flush, Stanley's list..... 50¢10 %
 Wrt B.K. Flush, Com'n..... 55¢10 %

Stove and Flow—

Stove..... 60 %
 Flow..... 60 %
 R. B. W. Flow..... 55 %

Tire.

Common, list Feb. 23, '83..... 60 %
 Port Chester Bolt and Nut Company:
 Empire, list Feb. 23, '83..... 65 %
 Keystone, Philadel., list Oct. '84..... 80 %
 Norway, Phila., list Oct. '84..... 75 %
 American Screw Company:
 Norway, Phil., list Oct. 10, '84..... 75 %
 Eagle, Phil., list Oct. 16, '84..... 80 %
 Philadel., list Oct. 16, '84..... 80 %
 Bay State, list Feb. 23, '83..... 65 %
 R.B. & W., Philadel., list Oct. 16, '84..... 80 %

Worers, Tap.

Common and Kind..... 30¢10 %
 Ives' Tap Bore..... 35¢4 %
 Enterprise Mfg. Co..... 30¢10 %
 Clark's..... 33¢35 %

Borax.—

\$ 9 1/2 @ 10 1/2

Boring Machines—See Machines, Boring.

Bow Pins—See Pins, Bow.

Boxes, Wagon.

Per B..... 2 1/4

Braces—

American Bit Brace Co.:
 Nos. 10, 12, 20..... 60¢10 %
 Nos. 11, 21, 24, 27..... 70¢10 %
 Nos. 22, 32, 35..... 60¢10 %
 Nos. 13, 26, 30, 37..... 70¢10 %
 Ball Braces, net..... \$1.12 to \$1.25

Amidon's.

Barker's Imp'd Plain..... 75¢10¢80 %
 Barker's Imp. Nickleled..... 65¢10¢70 %
 Ratchet, Polished..... 75¢10¢80 %
 Eclipse Ratchet..... 60 %
 Globe Jawed..... 40¢40¢10 %
 Corner Brace..... 40¢40¢10 %
 Universal, 8 in., \$3.10 10 in., \$2.25
 Buffalo Ball..... \$1.10 \$1.15

Barber's.

Nos. 10 to 16..... 60 %
 Nos. 30 to 33..... 60 %
 Nos. 40 to 63..... 60 %
 Saxton's..... 60 %
 Barker's Imp. Polished..... 75¢10¢80 %
 Barker's Imp. Nickleled..... 65¢10¢70 %
 Ratchet, Polished..... 75¢10¢80 %
 Ratchet, Nickleled..... 40¢10 %
 Buffalo Ball..... net, \$1.10 \$1.15

Bartholomew's.

Nos. 25, 27 and 30..... 60¢10¢60 %
 Nos. 117, 118, 119..... 70¢70 %
 Common Ball, American..... \$1.00 \$1.10
 Fray's Genuine Spoford's..... 60¢60¢10 %
 Fray's No. 70 to 130, 81 to 123, 207 to 414..... 60¢10 %

Ives' New Haven Novelty.

New Haven Ratchet..... 60¢60¢10 %
 Barber Ratchet..... 60¢60¢10 %
 Barbors..... 60 %
 Oswood's Ratchet..... 40¢10 %
 P. S. & W. Co., Peck's Patent..... 60 %

Brackets—

Shelf plain, Sargent list, 55¢10¢55¢
 Shelf, fancy, Sargent's list, 60¢10¢60 %
 Reading, plain..... 50¢10¢60 %
 Reading, Rosette..... 60¢10¢60 %
 Bright Wire Goods—See Wire.

Brothers—

Henle Self-Inch..... 9 10 9 1/2
 Basting, Per dos..... \$4.50 5.50 6.50
 New Haven..... 50 %
 Wire Goods Co..... 65¢10 %

Buckets, Well.

Galvanized—

Hill's..... \$ dos, 12 qt, \$4.35; 14 qt, \$4.25
 Iron Clad..... \$ dos, 14 qt, \$4.25 \$4.40
 Helwig's Flat Iron Band..... 13.75
 Helwig's Wired Top..... \$ dos \$4.00

Bull Rings—See Rings, Bull.

Butchers' Cleavers—See Cleavers, Butchers'.

Butts—

Wrought Brass..... 75¢10¢80 %
 Cast Brass, Tiebout's..... 50 %
 Cast Brass, Corbin's, Fast..... 35¢10 %
 Cast Brass, Loose Joint..... 35¢10 %

Cast Iron—

Fast Joint, Narrow..... 60¢10¢50 %
 Fast Joint, Broad..... 55¢10 %
 Loose Joint..... 55¢10 %
 Loose Joint, Japanned..... 70¢10 %
 Loose Joint, Jap. with Acorns..... 75 %
 Parliament Butts..... 70¢10 %
 Mayer's Hinges..... 70 %
 Loose Pin, Acorns..... 70 %
 Loose Pin, Acorns, Japanned..... 70 %
 Loose Pin, Acorns, Japanned..... 70 %
 Plated Tips..... 70 %

Wrought Steel—

Fast Joint, Narrow..... 70 %
 Fast Joint, L. Narrow..... 70 %
 Fast Joint, Broad..... 70 %
 Loose Joint, Broad..... 70 %
 Table Butts, Rack Flaps, &c..... 70 %
 Inside Blind, Regular..... 70 %
 Inside Blind, Light..... 70 %
 Loose Pin..... 70 %
 Bronzed Wrought Butts..... 80 %

Callipers—See Compasses.

Calks, Toe—

Gautier, One Prong, Blunt..... 50 %
 Burke's, One Prong, Blunt..... 50 %
 Burke's, Two Prong, Blunt..... 70 %
 Burke's, One Prong, Sharp..... 60 %

Can Openers—See Openers, Can.

Carde—List January 23, 1891.

Watson's Cotton, Wool, Horse and File.

File..... 25 %

Carpet Stretchers—See Stretchers, Carpet.

Carpet Sweepers—See Sweepers, Carpet.

Cartridges—See Ammunition.

Casters—

Bed..... } Brass..... 55¢55¢10 %
 Plate..... } Others..... 60¢60¢10 %
 Shallow Socket..... 40 %
 Deep Socket..... 40 %
 Yale Casters, list May, 1884..... 30¢10 %
 Yale, Gem..... 50¢60 %
 Martin's Patent (Phoenix)..... 45¢10 %
 Payson's Anti-Friction..... 60¢60 %
 Giant Truck Casters..... 80 %
 Stationary Truck Casters..... 60¢10 %
 Socket Truck Casters..... 60 %

Cattle Leaders—See Leaders, Cat-

tle.

Cement.

Victor Elastic..... 5 1/2 pails \$ 2 5/8

Chain—

Trace, Wagon and Fancy Chains,
 List revised April 31, 1890..... 60 %
 American Coil, in cask lots,
 3-16 1/4 4-16 1/4 5-16 1/4
 \$7.75 6.45 5.55 4.50 3.65 3.20 2.30
 (Less than cask lots, add 1/4 @ 1/4 %)
 German Coil, list Oct. 6, 1890..... 60¢60 %
 German Hailer Chain, list Oct. 6, 1890..... 60¢60 %

Covert Halter—

Covert Traces..... 60¢25 %

Covert

Chucks.
Beach Pat. each, \$5.00.....25¢
Horse's Adjustable, each, \$7.00, 30¢
Danbury.....each, \$4.00, 30¢
Syracuse.....each, \$3.50, 25¢
Graham's Patent.....33¢
Strainer's Patent Chucks.....33¢
Combination Lathe Chucks.....33¢
Universal Lathe Chucks.....40¢
Independent Lathe Chucks.....40¢
Drill Chucks.....15¢
Union Mfg. Co.....\$5.00, 25¢
Victor.....40¢
Combination.....40¢
Universal.....40¢
Independent.....40¢

Churns.
Tiffin Union, each, 5 gal. \$3.25; 7 gal., \$3.75; 10 gal. \$4.25.
McDonald Star Barrel Churn, each, 5 gal. \$2.50; 10 gal., \$2.75; 15 gal., \$3.00; 20 gal. \$3.25.

Clamps.
R. I. Tool Co.'s Wrought Iron.....25¢
Adjustable, Cincinnati.....40¢
Adjustable, Hammers.....15¢
Adjustable, Stearn's.....30¢
Stearns' Adjustable Cabinet and Corset Cabinet, Sargent's.....30¢
Carriage Makers, Sargent's.....70¢
Eberhard Mfg. Co.....40¢
Parallel, C. H. Bealy & Co.....40¢
Warner's.....40¢
Saw Clamps, see Vices, Saw Filers.....30¢
Carpenters', Cincinnati.....30¢

Cleavers.
Butchers.....35¢
Bradley's.....30¢
L. & T. J. White.....40¢
Beatty's.....40¢
New Haven Edge Tool Co.'s.....40¢
P. S. & W.....30¢
Foster Bros.....30¢
Schulte, Lohoff & Co.....40¢

Clips.
Norway Axle, 1/4 & 5-16.....55¢
and grade Norway Axle, 1/4 & 5-16 65¢
Superior Axle Clips.....65¢
Norway Spring Bar Clips, 5-16 65¢
Wrought-Iron Felloe Clips.....55¢
Steel Felloe Clips.....55¢
Baker Axle Clips.....55¢

Cloth and Netting, Wire-See
Wire, &c.

Cocks.
Cocks, Brass.....50¢
Hardware list.....50¢

Coffee Mills-See Mills, Coffee.

Collars, Dog, &c.
Medford Fancy Goods Co.....40¢
Embossed, Gilt, Pope & Steven's list.....30¢
Leather, Pope & Steven's list.....40¢
Brass, Pope & Steven's list.....40¢
Chapman Mfg. Company.....50¢

Combs, Curry.
Fitch's.....50¢
Rubber, per doz \$10.00.....20¢
Perfect.....40¢
Kellogg's.....50¢
Sweet & Clark's.....50¢

Compasses, Dividers, &c.
Compasses, Callipers, Dividers, 70¢
Bemis & Call Co.'s.....60¢
Dividers.....60¢
Compasses & Callipers.....60¢
Wing and Inside or Outside.....60¢
Double.....60¢
(Call's Pat. Inside).....60¢
Excutor.....60¢
J. Stevens & Co.'s.....60¢
Starrett's.....60¢
Spring Callipers and Dividers.....60¢
Lock Callipers and Dividers.....60¢
Combination Dividers.....60¢

Coopers' Tools-See Tools, Coopers'.

Cord.
Sash.....10¢
Common.....10¢
Patent, good quality.....10¢
White Cotton Braided, fair.....10¢
Common Russia Sash.....10¢
Patent.....10¢
Cable Laid Italian Sash.....10¢
Indian Cable Laid.....10¢
Silver Lake.....10¢

Drill Bits.
Quality, White, 50¢.....10¢
Quality, Drab, 50¢.....10¢
Quality, White, 50¢.....10¢
Quality, Drab, 50¢.....10¢
Quality, White (only).....10¢
Sylvan Spring, Extra Braided, White, 34¢
Sylvan Spring, Extra Braided, Drab, 34¢
Semper Idem, Braided, White, 30¢
Egyptian, India Hemp, Braided, 25¢
Samson.....25¢

Drill Bits.
Braided, White Cotton, 50¢.....30¢
Braided, Drab Cotton, 50¢.....30¢
Braided, Italian Hemp, 50¢.....30¢
Braided, Linen, 50¢.....30¢
Tate's Cot'n Braided, White, 50¢.....40¢
Tate's Cot'n Braided, Drab, 50¢.....40¢

Wire Picture.
Braided or Twisted.....75¢

Corkscrews-See Screws, Cork.

Corn Knives and Cutters-See
Knives, Corn.

Crackers, Nut-
Table (H. & B. Mfg. Co.).....40¢
Blake's Patents.....40¢
Turner & Seymour Mfg. Co.....50¢

Cradles-
Grain.....50¢
White Cradles, 50¢.....10¢
D. M. Stewart Mfg. Co., Metal Work.....10¢
D. M. Stewart Mfg. Co., Rolling Mill.....10¢
See also Chalk.....30¢

Crow Bars-See Bars, Crow.

Curry Combs-See Combs, Curry.

Curtain Pins-See Pins, Curtain.

Cutters-
Meat.
Dixon's Pat. dos.....40¢
Nos.....1 2 3 4 5
\$14.00 \$17.00 \$19.00 \$20.00

Woodruff's Pat. dos.....40¢
Nos.....100 150
\$15.00 \$18.00

Hales Pattern Pat. dos.....70¢
Nos.....11 12 13
\$37.00 \$38.00 \$45.00

American.....30¢
Each.....\$5 \$7 \$10 \$25 \$50 \$60

Enterprise.....30¢
Nos.....10 12 22 32 42
Each.....\$3 \$5 \$6 \$8 \$15

Great American Meat Cutter.....40¢
Nos.....112 116 118 120 122
Each.....\$3.00 \$2.75 \$3.00 \$2.50 \$4.00

Miles' Challenge Pat. dos.....45¢
Nos.....1 2 3
\$22.00 \$20.00 \$40.00

Home No. 1.....\$20.00, 55¢
Draw Cut, each.....\$20.00, 55¢

Great American.....30¢
Reef Shavers (Enterprise).....30¢
Little Giant.....50¢
Chadborn's Smoked Beef Cutter, 50¢
\$60.00

Tobacco.
Champion.....20¢
Wood Bottom.....\$5.00
All Iron.....\$5.00
Nashua Lock Co.'s.....50¢
Wilson's.....55¢
Sargent's.....55¢
Acme.....\$20.00, 40¢

Washer.
Smith's Pat. dos \$12.00, 20¢
Johnson's.....\$11.00, 35¢
Penny's dos Pol. \$15; Jap'd, \$16.00, 55¢
Appleton's.....\$16.00, 60¢
Bonney's.....\$16.00, 60¢
Cincinnati.....30¢

Dampers, &c-
Dampers, Buffalo.....40¢
Buffalo Damper Clips.....40¢
Crown Damper.....40¢
Excelsior.....40¢

Diggers, Post Hole, &c-
Samson Post Hole Digger, 50¢
Fletcher Post Hole Augers, 50¢
Eureka Diggers.....\$12.50, 14.00
Lead's.....\$8.00, 9.00
Vaughan's Post Hole Auger.....\$13.00, 14.00

Kohler's Little Giant.....\$18.00
Kohler's Hercules.....\$18.00
Kohler's New Champion.....\$18.00
Schneider.....\$18.00
Ryan's Post Hole Diggers.....\$24.00
Cronk's Post Bars, 50¢
Gibbs Post Hole Digger, 50¢
Imperial, 50¢

Dividers-
See Compasses.

Dog Collars-See Collars, Dog, &c.

Door Springs-See Springs, Door.

Drawers.
Money, 50¢
Drawing Knives-See Knives, Drawing.

Drills and Drill Stocks-
Blacksmith's.....each \$1.75
Blacksmith's Self-Feeding, each \$7.50, 30¢
Breast, P. S. & W.....40¢
Breast, Wilson's.....30¢
Breast, Miller's Falls.....\$3.00, 25¢
Breast, Bartholomew's.....each \$2.50, 25¢

Ratchet, Merrill's.....30¢
Ratchet, Ingersoll's.....25¢
Ratchet, Parker's.....20¢
Ratchet, Whitney's.....20¢
Ratchet, Weston's.....20¢
Ratchet, Moore's Triple Action.....25¢
Ratchet, Curtis & Curtis.....30¢
Whitney's Hand Drill, Plain, \$11.00;
Adjustable, \$12.00.....30¢
Wilson's Drill Stocks.....10¢
Automatic Drilling Tools.....\$1.75, \$1.85

Test Drills-
Morse.....50¢
Standard.....50¢
Syracuse (Metal List).....50¢
Cleveland.....50¢
Williams.....50¢
New Process.....50¢
Graham's Pat. Groove Shank 50¢

Drill Bits.-See Augers and Bits.

Drill Chucks.-See Chucks.

Dripping Pans-See Pans, Dripping.

Drivers, Screw.
Douglas Mfg. Co.....30¢
Buck Bros.....30¢
Stanley R. & L. Co.'s
Varnished Handles.....55¢
Black Handles.....60¢
Sargent & Co.'s
No. 1 Forged Blade.....60¢
Nos. 2, 3 and 60.....60¢
P. S. & W.....70¢
Knapp & Cowies
No. 1.....60¢
No. 2.....60¢
No. 3.....60¢
Nos. 4 and 60, Acme and Ideal.....50¢
Stearns'.....50¢
Day & Parsons.....50¢
Champion.....50¢
Clark's Pat.....50¢
Crawford's Adjustable.....30¢
Ellrich's Socket and Ratchet.....25¢
Allard's Spiral, new list.....25¢
Kohl's Common Sense 50¢
Syracuse Screw-Driver Bits.....50¢
Screw-Driver Bits.....50¢

Screw-Driver Bits, Parr's.....\$20.00
Fray's Hol. Hdie. Sets. No. 3, \$12.00,
25¢
P. D. & Co.'s all Steel.....50¢
Cincinnati.....25¢
Brace Screw Drivers.....25¢
Buck Bros' Screw-Driver Bits.....25¢

Egg Beaters.-See Beaters, Egg.

Egg Poachers.-See Poachers, Egg.

Electric Bell Sets.-See Bells, Elec-
tric.

Emery.-No. 4 to No. 54 to Flour, CF
46 gr. 150 gr. F. YF.
Kegs, 50 lbs.....45¢
50 lbs.....55¢
50 lbs.....55¢
10-lb cans, 10.....65¢
10-lb cans, less than 10.....10¢

Enamelled and Tinned Ware-See
Ware, Hollow.

Escutcheon Pins-See Pins, Es-
cutcheon.

Escutcheons.
Door Lock.....Same dis as Door Locks.
Brass Thread.....60¢
Wood.....25¢

Expanded Metal.
List No. 5.

Lathing.....10¢
Fencing, Painted Sheets.....20¢
Netting, Painted Sheets.....20¢
Door Mats, Galvanized.....25¢
Window Guards, Paneled.....15¢
Tree Guards, Paneled.....15¢

Fasteners, Blind-
Mackrell's, 50¢
Van Sand's Screw Pat., \$15 gr. 60¢
Van Sand's Old Pat., \$15.00 gr. 65¢
Washburn's Old Pattern, 50¢
Merriman's.....new list
Austin & Eddy No. 2008 gr. \$9.00
Security Gravity, gr. \$9.00

Faucets.-
Fenn's.....40¢
Bohren's Pat. Rubber Ball.....40¢
Fenn's Cork Stops.....35¢
Star.....60¢
Frary's Pat. Petroleum.....40¢
H. & L. B. Co.
West's Lock, Open and Shut Key.....50¢
Star Metal Plug, new list.....40¢
Lockport Metal Plug, reduced list.....40¢
Metallic Key, Leather Lined.....60¢
Cork Lined.....70¢
Burnside's Red Cedar.....60¢
Burnside's Red Cedar, bbl lots.....50¢
John Sommers'.....40¢
Peerless Best Cork Tin Key.....40¢
IXL, 1st quality, Cork Lined.....50¢
Diamond Lock.....40¢
Perfection, Fla. Red Cedar.....50¢
Goodenough Cedar.....50¢
Boss Metallic Key.....60¢
Reliable Cork Lined.....60¢
Western Pattern Cork Lined.....50¢
Self-Measuring.....30¢
Enterprise, 50¢
Lane's, 50¢
Victor, 50¢

Felloe Plates-See Plates, Felloe.

Fifth Wheels.-
Derry and Cincinnati.....45¢
Brewster.....50¢

Files-
Domestic.....60¢
Nicholson Files, Rasps, &c.....60¢
Nicholson (X. F.) Files.....25¢
Nicholson's Royal Files (Seconds).....75¢
G. & H. Barnett (Black Diamond).....60¢
Eagle.....60¢
Other makers, best brands.....60¢
Fair brands.....60¢
Second quality.....70¢
Heller's Horse Rasps.....50¢
McCaffrey's Horse Rasps.....50¢
Chelsea Horse Rasps, Hand Cut.....50¢
Imported.....50¢
Moss & Gamble.....List, April 1, 1883, 15¢
Butcher.....Butcher's list, 20¢
Turton.....Turton's list, 25¢
Greaves' Horse Rasps, American list, 60¢

Fixtures.
Grindstone.....70¢
Reading Hardware Co.....30¢
P. S. & W. Co.....50¢

Fluting Machines-See Machines,
Fluting.

Fluting Scissors-See Scissors,
Fluting.

Fodder Squeezers-See Squeezers,
Fodder.

Forks.
Hay, Manure, &c., Also List, 65¢
Hay, Manure, &c., Phila. List, 60¢
Plated, see spoons.

Frames-
Saw.....\$20.00, 10.00
White Vermont.....\$20.00, 10.00
Red, Polished and Varnished.....\$1.50, 25¢

Screen, Window and Door-
Porter's Pat. Window and Door Frame.....35¢
Warner's Screen Corner Irons.....35¢
Stearns' Frames and Corners.....25¢
Cortland.....40¢

Freezers, Ice Cream-
White Mountain.....60¢
Granite State.....60¢
Artic.....70¢
American.....60¢
Buffalo Champion.....65¢
Shepherd's Lightning.....65¢

Gem.....65¢
Blissard.....70¢
Double Action Crown.....60¢
Crown.....60¢
Star.....60¢
Peerless.....60¢
Giant.....60¢
Zoro.....60¢
Boss and Pat.....\$10.00, 10.00
Keystone, P. D. & Co., each, \$1.50.....30¢

Fruit and Jelly Presses-See
Presses, Fruit and Jelly.

Fry Pans-See Pans, Fry.

Funnels.
Gerardoff's Perfection, Standard and
Globe; 7 in, 1 gro, 10 5; 2 to 5 gro,
20 5; 5 to 10 gro.....30¢
Copper, 1 to 6 doz, 15 5; 6 to 12
doz, 50 5; over 12 doz.....25¢

Furnaces, Soldering.
Burgess No. 3 Gem, tin reservoir.....\$7.00
Burgess No. 3 Gem, copper reservoir, 5.50

Fuse-
Common Hemp Fuse, for dry ground, 2.35
Common Cotton Fuse, for dry ground, 2.35
Single Taped Fuse, for wet ground.....3.35
Double Taped Fuse, for very wet gr. 4.35
Triple Taped Fuse, for very wet gr. 5.00
Small Gutta Percha Fuse, for water, 7.50
Large Gutta Percha Fuse, for water, 12.00

Gates, Molasses-
Stebbin's Pattern.....75¢
Stebbin's Genuine.....60¢
Stebbin's Tinned Ends.....40¢
Chase's Hard Metal.....30¢
Smith's.....70¢
Lincoln's Pattern.....70¢
Weed's.....30¢
Boss, 50¢
No. 1, 57; No. 2, 35; No. 3, 30; No. 4,
110.....60¢

Gauges.
Marking, Mortise, &c.....60¢
Starrett's Surface, Center and Scratch.....25¢
Wire, low list.....10¢
Wire, Wheeler, Madden & Co.....10¢
Wire, Morse's.....25¢
Wire, Brown & Sharpe's.....10¢
Wire, P. S. & W. Co.....10¢

Gimlets-
Nail and Spike.....50¢
Eureka's Gimlets.....40¢
Diamond's Gimlets.....45¢
Double Cut, Sheppardson's.....45¢
Double Cut, Ives.....60¢
Double Cut, Douglas.....40¢
"Bee," gr \$12.....25¢

Glue-
Le Page's Liquid.....35¢
Upton's Liquid.....35¢
Improved Process.....35¢

Glue Pots-See Pots, Glue.

Grease, Axle.
Fraser's.....Keg 50 lbs, 49¢
Fraser's, in boxes.....\$20.00
Dixon's Everlasting, in bxs.....\$1.30; 2 b \$3.00
Dixon's Everlasting.....10-lb pails, ea 35¢
Lower grades, special brands.....\$5.50, \$7.00

Grindstones-
Small, at factory.....\$7.50, \$9.00
Family, Cleveland Stone Co.....20¢

Grindstone Fixtures-See Fixtures,
Grindstone.

Hack Saws-See Saws.

Hafte, Awi.
Sewing, Brass For, gr. \$3.50.....45¢
Pat. Sewing, Short, \$1.00 dos.....40¢
Pat. Sewing, Long.....\$1.20
Pat. Peg, Plain Top, gr \$10.00.....45¢
Pat. Peg, Leather Top, gr \$12.00.....45¢

Halters.
Covert's, Rope, 1/2 in. Jute.....50¢
Covert's, Rope, 1/2 in. Hemp.....50¢
Covert's, Rope, 1/2 in. Hemp.....50¢
Covert's, Rope, 1/2 in. Hemp.....50¢
Covert's, Rope, 1/2 in. Hemp.....50¢

Hammers-
Handled Hammers.....25¢
Maydole's, list Dec. 1, '85.....25¢
Buffalo Hammer Co.....50¢
Rumason & Beckley.....50¢
Athen Tool Co.....50¢
Fayette R. Plumb.....50¢
C. Hammond & Son.....50¢
Verree.....50¢
Hartford, Nail Hammers.....40¢
Hartford, Machinists, &c.....50¢
Magnetic Tack, No. 1, 2, 3, \$1.25, 1.50 &
1.75.....40¢
Nelson Tool Works.....40¢
Warner & Nobles.....40¢
Peck, Stow & Wilcox.....40¢
Sargent's.....35¢
Heavy Hammers and Sledges.....\$3.00
3 to 5 lb.....\$3.00, 70¢
Over 5 lb.....\$3.00
Wilkinson's Smiths.....10¢

Handcuffs and Leg Irons-See
Police Goods.

Handles-
Atkins' No. 1 Loop, 5 pair, 25¢; No.
13¢; No. 6, 13¢; No. 3 and No.
Reversible, 18¢.

Cross-Cut Saw Handles-
Boynton's Loop Saw Handles, 50¢.....60¢
Champion.....10¢

Iron, Wrought or Cast-
Door or Thumb.
Nos.....0 2 3
Per doz.....\$0.90 1 lb 1.15 1.25 1.50
60¢, 70¢, 80¢

Hoggin's Latches..... 50c
 Bronze Iron Drop Latches..... 70c
 Jap'd Store Door Handles—Nuts, 1.12;
 Plate, 1.10; no Plate, 90c. net
 Barn Door, 70c; 1.40. 10c
 Chest and Lifting..... 70c

Wood—

Saw and Plane..... 40c
 Hammer Hatchet, Axe, Sledge, &c. 40c
 Brad Axl..... 20c
 Hickory Firmer Chisel, ass'd..... 50c
 Hickory Firmer Chisel, large..... 50c
 Apple Firmer Chisel, ass'd..... 50c
 Apple Firmer Chisel, large..... 50c
 Rocket Firmer Chisel, ass'd..... 50c
 Rocket Framing Chisel, ass'd..... 50c
 I. S. Smith & Co.'s Pat File..... 50c
 File, assorted..... 50c
 Auger, assorted..... 50c
 Auger, large..... 50c
 Pat. Auger, Ives..... 50c
 Pat. Auger, Douglas..... 50c
 Pat. Auger, Swan's..... 50c
 Hoe, Rake, Shovel, &c..... 50c

Hangers—

Barn Door, old pattern..... 50c
 Barn Door, New England..... 50c
 Samson Steel Anti-Friction..... 50c
 Orleans Steel..... 50c
 Hamilton Wrought Wood Track..... 50c
 U. S. Wood Track..... 50c
 Champion..... 50c
 Rider and Wooster, Medina Mfg. Co.'s
 List..... 50c
 Climax Anti-Friction..... 50c
 Climax Anti-Friction for Wood Tracks..... 50c
 Zenith for Wood Track..... 50c
 Reed's Steel Arm..... 50c
 Challenge, Barn Door..... 50c
 Sterling..... 50c
 Victor, No. 1, 1.15.00; No. 2, 1.16.00;
 No. 3, 1.17.00..... 50c
 Cherter..... 50c
 Kidder's..... 50c
 The Bow..... 50c
 Best Anti-Friction..... 50c
 Duplex (Wood Track)..... 50c
 Terry's Pat., 5 in. 10.00; 6 in.
 12.00..... 50c
 Terry's Steel Anti-Friction Leader..... 50c
 Terry's Steel Anti-Friction Ideal..... 50c
 Cronk's Patent, Steel Covered..... 50c
 Wood Track Iron Clad, 7 ft. 10c..... 50c
 Carrier Steel Anti-Friction..... 50c
 Architect, 7 set 50.00..... 50c
 Felix, 7 set 4.50..... 50c
 Richards..... 50c
 Lane's Standard..... 50c
 Lane's New Standard..... 50c
 Ball Bearing Door Hanger..... 50c
 Warner's Pat..... 50c
 Besant's Anti-Friction..... 50c
 Stearns' Challenge..... 50c
 Faultless..... 50c
 American, 7 set 50.00..... 50c
 Rider & Wooster, No. 1, 1.15.00; No. 2,
 7.00..... 50c
 Paragon, Nos. 1, 2 and 3..... 50c
 Cincinnati..... 50c
 Paragon, Nos. 5, 7, 7 and 8..... 50c
 Crescent..... 50c
 Nickel Cast Iron..... 50c
 Nickel, Malleable Iron and Steel..... 50c
 Benton Anti-Friction Single Strap..... 50c
 Wild West, 4 in. Wheel, 1.15.00; 5 in.
 Wheel, 1.21.00..... 50c
 Star..... 50c
 May..... 50c
 Barr, 50.00..... 50c
 Interstate..... 50c
 Magic..... 50c

Harness Snaps—See Snaps.

Hatchets—

American Axe and Tool Co.
 Blood's..... 40c
 Hunt's..... 40c
 Hunt's..... 40c
 Hunt's..... 40c
 Peck's..... 40c
 Underhill..... 40c
 Buffalo Hammer Co..... 40c
 Fayette R. Plumb..... 40c
 C. Hammond & Son..... 40c
 Kelly's..... 40c
 Sargent & Co..... 40c
 F. S. & W. Co..... 40c
 Ten Eyck Edge Tool Co..... 40c
 Collins..... 40c
 Schulte, Lohoff & Co..... 40c

Hay and Straw Knives—See

Knives.

Hinges—

Blind Hinges—
 Parker..... 75c
 Palmer..... 50c
 Seymour..... 70c
 Huffer..... 50c
 Clark's, Nos. 1, 3, 5, 40 and 50..... 75c
 Clark's Mortise Gravity..... 50c
 Sargent's, Nos. 1, 3, 5, 11, 13..... 75c
 Sargent's, No. 12..... 75c
 Reading's Gravity..... 75c
 Shepard's..... 75c
 Noiseless..... 75c
 Niagara..... 80c
 Clark's Genuine Pattern..... 80c
 O. S. Lull & Porter..... 75c
 Ames, Lull & Porter..... 75c
 Queen City Haverdell..... 75c
 Clark's Lull & Porter, Nos. 9, 1, 11,
 & 24, 3..... 75c
 North's Automatic Blind Fixtures, No.
 2, for Wood, 90.00; No. 3, for Brick,
 11.50..... 10c
 Gate Hinges—
 Western..... 50c
 N. E. Reversible..... 50c
 Clark's, Nos. 1, 2, 3..... 50c
 N. Y. State..... 50c
 Automatic..... 50c
 Common Sense..... 50c
 Seymour's..... 50c
 Shepard's..... 50c
 Reed's Latch and Hinges..... 50c

Spring Hinges—

Union Spring and Blank Butts..... 50c
 Year's Spring Hinge Co.'s List, March
 1890..... 50c

Acme..... 50c
 J. S..... 50c
 Empire and Crown..... 50c
 Hero and Monarch..... 50c
 American, Gem, and Star..... 50c
 Oxford..... 50c
 Barker's Double Acting..... 50c
 Union Mfg. Co..... 50c
 Sommer's..... 50c
 Suckman's..... 50c
 Chicago..... 50c
 Wiles..... 50c
 Devore's..... 50c
 Ret..... 50c
 Royal..... 50c
 Reliable..... 50c
 Champion..... 50c
 Bardeley's Patent..... 50c
 Stearns..... 50c
 Niagara, Holdback pattern, per
 gross..... 14.00

Wrought Iron Hinges

List February 14, 1891.
 Strap and T..... 50c
 Corrugated Strap and T..... 50c
 Screw Hook and..... 50c
 14 to 20 in., 50c
 22 to 36 in., 50c
 Screw Hook and Eye..... 50c
 14 in., 50c
 18 in., 50c
 Rolled Blind Hinges, Nos. 33 and 34..... 50c
 Rolled Blind Hinges, Nos. 33 and 34..... 50c
 Rolled Plate..... 50c
 Rolled Raised..... 50c
 Plate Hinges, 8, 10 & 12 in., 50c
 "Providence" over 12 in., 50c

Hoes—

D. & H. Scovill..... 20c
 Lane's Crescent Plaster Pattern..... 45c
 Lane's Razor Blade, Scovill Pattern..... 30c
 Maynard, S. & O. Pat..... 45c
 Sandusky Tool Co. S. & O. Pat..... 10c
 Am. Axe and Tool Co. S. & O. Pat..... 10c
 Pat..... 10c
 Chattanooga Tool Co. S. & O. Pat..... 10c
 Grub..... 10c

Handled—

Garden, Mortar, &c..... 55c
 Planter's Cotton &c..... 55c
 Warren Hoe..... 50c
 Magic..... 50c

Hog Rings and Ringers—See

Rings and Ringers.

Hoisting Apparatus—See Ma-

chines, Hoisting.

Hollow-Ware—See Ware, Hollow.

Holders.

Bag.
 Sprengle's Pat..... 50c
 Bit.
 Extension..... 40c
 Barber's..... 40c
 Ives..... 40c
 Diagonal..... 40c
 Angular..... 40c

File and Tool—

Bals Pat..... 50c
 Nicholson File Holder's List..... 30c
 Dick's Tool Holder..... 30c

Hooks—

Cast Iron—
 Bird Cage, Sargent's List..... 50c
 Bird Cage, Reading..... 50c
 Clothes Line, Sargent's List..... 50c
 Clothes Line, Reading List..... 50c
 Ceiling Sargent's List..... 50c
 Harness, Reading List..... 50c
 Coat and Hat, Sargent's List..... 50c
 Coat and Hat, Reading..... 50c

Wrought Iron—

Cotton..... 50c
 Cotton Pat. (N.Y. Mallet & Handle Wks.)..... 50c
 Tassel and Picture (T. & S. Mfg. Co.)..... 50c
 Wrought Staples, Hooks, &c..... 50c
 See Wrought Goods.

Wire—

Wire Coat and Hat, Gem, list April
 1890..... 50c
 Wire Coat and Hat, Miller, list April
 1890..... 50c
 Indestructible Coat and Hat..... 50c
 Wire Coat and Hat, Standard..... 50c
 Handy Hat and Coat..... 50c
 Steady Ceiling Hooks..... 50c
 Belt..... 50c
 Atlas Coat and Hat..... 50c

Miscellaneous.

Grass, No. 2, 22.00; No. 3, 22.25; No. 4, 22.50
 Bush's..... 22.50
 N. Y. B. & P. Co. Pat..... 22.50
 N. Y. B. & P. Co. Extra..... 22.50
 N. Y. B. & P. Co., Dundee..... 22.50
 Hooks and Eyes—Malleable Iron..... 70c
 Hooks and Eyes—Brass..... 70c
 Fish Hooks, American..... 50c
 Bench Hooks..... 50c
 See Bench Stops.

Horse Nails—See Nails, Horse.

Horse Shoes—See Shoes, Horse.

Hose, Rubber—

Competition..... 75c
 Standard..... 60c
 N. Y. B. & P. Co. Pat..... 22.50
 N. Y. B. & P. Co. Extra..... 22.50
 N. Y. B. & P. Co., Dundee..... 22.50
 Huskers—
 Blair's Adjustable..... 50c
 Blair's Adjustable Clipper..... 50c
 Hubbard's Solid Steel..... 50c

Indurated Fiber-Ware—See

Ware, Indurated Fiber—
 Irons.
 Sad—
 From 4 to 10, at factory..... 100c
 Self-Heating..... 22.50
 Self-Heating, Tailors..... 22.50
 Mrs. Pott's Irons..... 50c
 Enterprise Star Irons..... 50c
 XX Cold Handle Rod Irons..... 50c

Ideal Irons new list 50c to 10c
 Salamander, Irons..... 25c
 B. B. Sad Irons..... 30c
 Combined Fluter and Sad Iron..... 30c
 1.15.00..... 15c
 Fox Reversible, Self-Fluter 50c
 Chinese Laundry (N.E. Butt Co.) 80c
 New England..... 15c
 Mahony's Troy Pol. Irons..... 15c
 Sensible, list Jan. 91..... 50c
 Sensible Tailor's Irons..... 35c
 National Self-Heating..... 30c
 Soldering..... 30c
 Cover's Adjustable, list Jan. 1 1890..... 35c

Irons, Pinking, per doz., 65c.

Jack Screws—See Screws.

Jack, Wagon.

Daisy..... 35c
 Victor..... 35c

Kettles—

Brass, Spun, Plain, list Jan. 1, '91, 25c
 Brass Spun, Plain, list Jan. 1, '91, 30c
 Enamelled and Tea—See Hollow Ware.

Keys—

Lock Ass'n list Dec. 30, 1890..... 50c
 Eagle, Cabinet, &c..... 35c
 Hotchkiss' Brass Blanks..... 40c
 Hotchkiss, Copper and Tinned..... 40c
 Hotchkiss' Pad and Cab..... 40c
 Ratchet Bed Keys..... 40c
 Wollensak Tinned..... 40c

Knife Sharpeners—See Sharpen-

ers, Knife.

Knives.

Butcher, Shoe, &c—
 Wilson's Butcher Knives, list Dec. 8,
 1890..... 25c
 Ames' Butcher Knives..... 25c
 Foster Bros' Butcher, &c..... 40c
 Jordan's A.A.I. Butchers', list..... 40c
 Nichols' Butcher Knives..... 40c
 W. Wilson, Butcher, 6 in., 22.00; 7
 in., 22.70; 8 in., 23.50, &c..... 40c
 Ames' Shoe Knives..... 30c
 Ames' Bread Knives..... 30c
 Moran's Shoe and Bread..... 30c
 Hay and Straw..... 30c
 Hay and Straw..... 30c
 Corn, Auburn Mfg. Co. Crescent..... 35c

Corn—

Bradley's..... 10c
 Wadsworth's..... 10c

Drawing—

With..... 75c
 P. S. & W..... 75c
 Mix..... 75c
 New Haven..... 75c

Lighting, Mfrs' price 50c to 10c, 25c

often selling at 25c to 30c
 Wadsworth's..... 40c
 Carter's Needle..... 40c
 Heath's..... 40c
 Auburn Hay, Com. and Spear Point..... 40c
 Auburn, Straw..... 40c
 Noth's Hay..... 40c

Am. (2nd quality), 7 gr., 1 blade, 7;

2 blades, 12; 3 blades, 18..... 40c
 Smith's, 50c, Single, 22.00; Double, 35

Knaps & Cowles.

Buffalo Adjustable..... 30c
 Buffalo Double Adjustable..... 30c

Kasbs—

Door Mineral..... 60c
 Door Por. Jap'd..... 70c
 Door Por. Nickel..... 70c
 Door Por. Plated, Nickel..... 70c
 Taber, Porcelain..... 70c
 Rematic Door Knob..... 70c
 Yale & Towne Wood, list Dec. 1890..... 70c
 Furniture Plain..... 70c
 Furniture, Wood Screws..... 25c
 Base, Rubber Tip..... 70c
 Picture, Judd's..... 70c
 Picture, Sargent's..... 70c
 Picture, Rematic..... 70c
 Shutter, Porcelain..... 70c
 Carriage Jap..... 70c
 Bardeley's Wood Door, Shutter, &c..... 40c

Ladies—

Melting, Sargent's..... 55c
 Melting, Reading..... 55c
 Melting, Monroe's Pat..... 55c
 Melting, Warner's..... 55c

Lanterns—

Platin with Guards, 50c..... 3.75 to 4.00
 Lift Wire, with Guards..... 3.75 to 4.00
 Square Plain, with Guards..... 3.75 to 4.00
 Sq. Lift Wire, with Guards..... 3.75 to 4.00

Police Lanterns (including packages).

2 1/2-inch Bull's-eye Police regular..... 3.50
 3-inch Bull's-eye Police regular..... 3.50

2 1/2-inch Bull's-eye Police flash light..... 3.50

3-inch Bull's-eye Police flash light..... 3.50

Lawn Mowers—See Mowers, Lawn.

Lenders, Cattle.

Humason, Beckley & Co.'s..... 70c
 Sargent's..... 70c
 Hotchkiss..... 70c
 Sack, Stow & W. Co..... 70c

Lemon Squeezers—See Squeezers,

Lemon.

Lifters, Transom.

Wollensak's:
 Class 3 and 4, Bronzed Iron..... 50c
 Class 3 and 4, Bronze Metal..... 50c
 Class 3 and 4, Brass..... 50c
 Skylight Lifters..... 50c
 Crown, Kagle and Shield..... 50c
 Reiter's, list Feb. 20, 1891..... 50c
 Bronzed Iron Rods..... 50c
 Brass, Real Bronzed or Nickel Plate..... 50c

Excelsior..... 50c
 Shaw's..... 50c
 Payson's:
 Universal..... 50c
 Solid Grip..... 50c
 Imperial..... 50c

Lines—

Cotton and Linen Fish, Draper's..... 50c
 Draper's and Tate's Chalk..... 50c
 Draper's Mason's Linen, 2 1/2 in., No. 1,
 1.25; No. 2, 1.17; No. 3, 1.23; No. 4,
 1.27; No. 5, 1.33..... 50c
 Cotton Chalk..... 50c
 Samsor Cotton, No. 4, 1.23; No. 4 1/2, 1.25

Silver Lake, Braided, No. 3, 1.01

1, 1.05; No. 2, 1.07; No. 3, 1.10; No. 4,
 1.15..... 50c

Mason's Colored Cotton..... 50c

Wire Clothes, Nos. 12, 13, 14, 15, 16,
 100 ft..... 50c

Ventilator Cord, Samsor Braided,

White or Drab Cotton, 50c to 75c

Locks, &c.—

Cabinet—
 Eagle, Gaylord Par..... 1.25
 Jan. 1, '91, 1.25..... 1.25
 Delta, Nos. 36 to 38..... 40c
 Delta, Nos. 31 to 35..... 40c
 Delta, Nos. 26 to 30..... 40c
 Stoddard Lock Co..... 40c

"Champion" Night Latches..... 40c

Barnes Mfg. Co..... 40c
 Eagle and Corbin Trunk..... 40c
 "Champion" Cab. and Comb..... 40c
 Yale..... 40c
 Roman's..... 40c

Door Locks, Latches, &c.

R. & E. Mfg. Co., list Mar. 30,
 1890..... 50c

Mallory, Wheeler & Co., list

July 1, '91..... 50c

Sargent & Co., list Aug. 1, 1891

Reading Hardware Co., list
 Feb. 1, '91..... 50c

Brittan, Graham & Mathes, list Jan.

1890..... 50c

Perkins' Burglar Proof..... 50c

Place..... 50c
 Barnes Mfg. Co..... 50c
 Yale..... 50c

Delta Flat Key..... 50c

L. & C. Round Key Latches..... 50c
 L. & C. Flat Key Latches..... 50c
 Roman's Night Latches..... 50c
 Brooklyn Latches..... 50c
 Shepardon or U. S..... 50c
 Seed's N. Y. Hump Lock..... 50c

Padlocks—

List Dec. 31, '91..... 75c
 Brittan, Graham & Mathes..... 75c
 Yale Lock Mfg. Co.'s..... 75c
 Eagle..... 75c
 Eureka, Eagle Lock Co..... 75c
 Roman's, Nos. 0 to 91..... 75c
 Roman's Scandinavian, &c., Nos. 100 to
 505, 1.15..... 75c

A. E. Deits..... 50c

Champion Padlocks..... 50c
 Hotchkiss..... 50c
 Star..... 50c
 Horseshoe..... 50c
 Barnes Mfg. Co..... 50c
 Brown's..... 50c
 Scandinavian..... 50c
 E. T. Frain's Keystone Scandinavian..... 50c
 Nos. 110, 120, 130 and 140..... 50c
 Other Nos..... 50c
 Ames sword Co. up to No. 160..... 50c
 Ames sword Co. 160 to 180..... 50c
 Slaymaker Barry & Co..... 50c

No. 1010 line..... 55c

No. 41 line..... 40c
 No. 61 line..... 40c
 No. 21 line..... 75c

Sash, &c.

Clark's, No. 1, 1.10; No. 2, 1.25 7 gr..... 3.25
 Ferguson's..... 3.25
 Morris and Triumph, list Aug. 16, 1890..... 3.25

Victor..... 50c

Walker's..... 50c
 Attwell Mfg. Co..... 50c
 Reading..... 50c
 Hammond's Window Springs..... 50c
 Common Sense, Jap'd, Cored &
 Braced..... 50c
 Common Sense, Nickel Plated..... 50c

Universal..... 50c

Kempshall's Gravity..... 50c
 Kempshall's Model..... 50c
 Corbin's Daisy, list Feb. 15, 1890..... 70c
 Payson's Perfect..... 60c
 Hugin's Sash Balances..... 55c
 Hugin's New Sash Locks..... 55c
 Stoddard "Practical"..... 10c
 Ives' Patent..... 10c
 Liesche's, Nos. 100 and 110, 7 gr 25;
 105, 1.10.00..... 10c
 Davis, Bronze, Barnes Mfg. Co..... 50c
 Champion Safety, list March 1, 1890..... 50c

Security..... 50c

Buckeye..... 75c

Lumber Tools—See Tools, Lumber

Lustre—

Four-ounce Bottles..... 50c
 gross..... 1.75

Machines.

Boring—
 Without..... 50c
 Augers, Upright, Angular..... 50c
 Douglass..... 50c
 Sall's, Rice's Pat. 5.50 6.75 4.00 10.00
 Jennings..... 5.50 6.75 4.00 10.00
 Other Machines..... 2.50 2.75..... 50c
 Phillips' Patent..... 50c
 with Angers..... 7.00 7.50..... 25c
 Miller's Falls..... 7.50..... 25c

Knox, 4 1/2-inch Rolls..... 3.25 each

Knox, 6-inch Rolls..... 3.50 each

Eagle, 3 1/2-inch Roll, 2.15..... 25c

Eagle, 5 1/2-inch Roll, 2.25..... 25c

Crown, 4 1/2 in., 3.50; 6 in., 4.00; 8 in.,

5.50..... 50c

Crown Jewel 6 in., 3.50 each, 35c

American, 5 in., 3.00; 6 in., 3.40; 7 in.,
 4.50 each..... 50c

Domestic Fluter..... 50c

Geneva Hand Fluter, White Metal..... 50c

Crown Hand Fluter, No. 1, 1.15.00

1.12.50, 3.10.00..... 50c

Shepard Hand Fluter, No. 50 50c

15.50..... 50c

Atkins' Circular Shingle and Heading dis 50%
 Atkins' Silver Steel Diamond X Cuts foot 70%
 Atkins' Special Steel Dexter X Cuts foot 50%
 Atkins' Special Steel Diamond X Cuts foot 32%
 Atkins' Champion and Electric Tooth X Cuts foot 30%
 Atkins' Hollow Back X Cuts foot 20%
 Atkins' Mulay, Mill and Drag foot 40%
 Atkins' One-Man Saw, with handles, foot 40%
 Peace Circular and Mill foot 25%
 Peace Hand Panel and Rip foot 25%
 Peace Cross Cuts foot 25%
 Richardson's Circular and Mill foot 25%
 Richardson's X Cuts foot 25%
 Richardson's Hand, &c. foot 25%
 C. E. Jennings & Co., Hand, Panel and Rip foot 25%
 Hack Saws—
 Griffin's, complete foot 40%
 Griffin's Hack Saw, Blades foot 40%
 Star Hack Saws and Blades foot 25%
 Eureka and Crescent foot 25%
 Scroll—
 Lester, complete, \$10.00 foot 25%
 Rogers, complete, \$4.00 foot 25%
 Barnes' Builders' and Cabinet Makers' \$15. foot 25%
 Barnes' Scroll Saw Blades foot 25%
 Saw Frames—See Frames, Saw.
 Saw Sets—See Sets, Saw.
 Saw Tools—See Tools, Saw.
 Scales—
 Hatch, Counter, No. 171, good quality, \$21.00
 Hatch, Tea, No. 181, \$21.00
 Union Platform, Plain, \$21.00
 Union Platform, Striped, \$21.00
 Chatillon's Grocers' Trip Scales, \$21.00
 Chatillon's Eureka, \$21.00
 Chatillon's Favorite, \$21.00
 Family, Turnbills, \$21.00
 Riehle Bros.' Platform, \$21.00
 Scale Beams—See Beams, Scale.
 Scales, Fluting, \$21.00
 Scrapers—
 Adjustable Box Scraper (S. R. & L. Co.) \$21.00
 Box, 1 Handle, \$21.00
 Box, 2 Handle, \$21.00
 Dedance Box and Ship, \$21.00
 Foot, \$21.00
 Ship, Common, \$21.00
 Ship, R. I. Tool Co., \$21.00
 Screen Window and Door Frames—See Frames.
 Screw Drivers—See Drivers, Screw.
 Screws.
 Bench and Hand—
 Bench, Iron, \$21.00
 Bench, Wood, \$21.00
 Bench, Wood, Hickory, \$21.00
 Hand, Wood, \$21.00
 Lag, Blunt Point, List Jan. 1, 1890, \$21.00
 Coach and Lag, Gimlet Point, List Jan. 1, 1890, \$21.00
 Bed, \$21.00
 Hand Rail, Sargent, \$21.00
 Hand Rail, R. & F. Mfg. Co., \$21.00
 Hand Rail, Am. Screw Co., \$21.00
 Jack Screws, Millers Falls List, \$21.00
 Jack Screws, P. S. & W., \$21.00
 Jack Screws, Sargent, \$21.00
 Jack Screws, Stearns, \$21.00
 Cork—
 Humason & Beckley Mfg. Co., \$21.00
 Williamson's, \$21.00
 Howe Bros. & Hulbert, \$21.00
 Machine—
 Flat Head, Iron, \$21.00
 Round Head, Iron, \$21.00
 Wood—
 List January 1, 1891.
 Flat Head Iron, \$21.00
 Round Head Iron, \$21.00
 Flat Head Brass, \$21.00
 Round Head Brass, \$21.00
 Flat Head Bronze, \$21.00
 Round Head Bronze, \$21.00
 Rogers' Drive Screws, \$21.00
 Scroll Saws—See Saws, Scroll.
 Scythes.
 Grain, \$21.00
 Grass, \$21.00
 Scythe Snaths—See Snaths, Scythe.
 Nets.
 Aul and Tool.
 Aiken's Sets, Aul and Tools, No. 20, \$21.00
 Fray's Adj. Tool Hds., Nos. 1, 2, 3, \$21.00
 Miller's Falls Adj. Tool Hds., Nos. 1, 2, 3, \$21.00
 Henry's Combination Haft, \$21.00
 Brad Sets, No. 42, \$21.00
 Stanley's Excelsior, No. 1, \$21.00
 Square, \$21.00
 Round, \$21.00
 Buck Bros., \$21.00
 Cannon's Diamond Point, \$21.00
 Rivet.
 Regular List, \$21.00
 Saw—
 Stillman's Genuine, \$21.00
 Stillman's Imita., \$21.00
 Common Lever, \$21.00
 Merrill's No. 1, \$21.00
 Leach's, No. 0, \$21.00

Hammer, Hotchkiss, \$21.00
 Hammer, Bemis & Call Co.'s new Pat., \$21.00
 Bemis & Call Co.'s Lever and Spring Hammer, \$21.00
 Bemis & Call Co.'s Plate, \$21.00
 Bemis & Call Co.'s Cross Cut, \$21.00
 Aiken's Genuine, \$21.00
 Aiken's Imitation, \$21.00
 Hart's Fat Lever, \$21.00
 Diaston's Star, \$21.00
 Leopold, \$21.00
 Atkin's Lever, \$21.00
 Atkin's Criterion, \$21.00
 Croissant (Keller), No. 1, \$21.00
 Avery's Saw Set and Punch, \$21.00
 Chieftain H. R. Co.'s Superior, \$21.00
 Sharpeners, Knife.
 Parkins.
 Applewood Handles, \$21.00
 Rosewood or Cocobolo, \$21.00
 Shaves, Spoke.
 Iron, \$21.00
 Wood, \$21.00
 Bailey's (Stanley R. & L. Co.), \$21.00
 Stearns, \$21.00
 Cincinnati, \$21.00
 Goodell's, \$21.00
 Shears—
 American (Cast) Iron, \$21.00
 Barnard's Lamp Trimmers, \$21.00
 Seymour's, List, Dec. 1881, \$21.00
 Heinisch's, List, Dec. 1881, \$21.00
 Heinisch's Tailor's Shears, \$21.00
 First quality C. S. Trimmers, \$21.00
 Second quality C. S. Trimmers, \$21.00
 Acme Cast Shears, \$21.00
 Diamond Cast Shears, \$21.00
 Victor Cast Shears, \$21.00
 Howe Bros. & Hulbert, Solid Forged Steel, \$21.00
 Chicago Drop Forge & F. Co., Solid Steel Forged, \$21.00
 Claus Shear Co., Japaned, \$21.00
 Claus Shear Co., Nicked, same list, \$21.00
 Galvanic, 3 1/2 to 9 in., \$21.00
 Pruning Shears and Hooks.
 Diaston's Combined Pruning Hook and Saw, \$21.00
 Diaston's Pruning Hook, \$21.00
 E. S. Lee & Co.'s Pruning Tools, \$21.00
 Pruning Shears, Henry's Pat., \$21.00
 Henry's Pruning Shears, \$21.00
 Wheeler, M. & C. Co.'s Combination, \$21.00
 Dunlap's Saw and Chisel, \$21.00
 J. Mallinson & Co., No. 1, \$21.00
 P. S. & W. Co., \$21.00
 Snips, J. Mallinson & Co., \$21.00
 Sheaves—
 Sliding Door—
 M. W. Co., List July, 1888, \$21.00
 R. & E., List Dec. 18, 1888, \$21.00
 Corbin's List, \$21.00
 Patent Roller, \$21.00
 Patent Roller, Hatfield's, \$21.00
 Russell's Anti-Friction, List Dec. 18, 1888, \$21.00
 Moore's Anti-Friction, \$21.00
 Sliding Shutter—
 R. & E., List Dec. 18, 1888, \$21.00
 Sargent's List, \$21.00
 Reading List, \$21.00
 Ship Tools—
 L. & I. J. White, \$21.00
 Shoes, Horse, Mule, &c.—
 Horse—
 Burden's, Perkins', Phoenix and Bryden's Boss, at factory, \$21.00
 Bryden's Frog Pressure, at factory, \$21.00
 Add \$1 key to above prices.
 Oz, Wrought—
 Ton lots, \$21.00
 1000 lb lots, \$21.00
 500 lb lots, \$21.00
 Shot—
 Drop, up to BB, 25-b bag, \$21.00
 Drop, up to BB, 5-b bag, \$21.00
 Drop, BB and larger, 25-b bag, \$21.00
 Drop, BB and larger, 5-b bag, \$21.00
 Buck and Chilled, 25-b bag, \$21.00
 Buck and Chilled, 5-b bag, \$21.00
 Dust Shot, 25-b bag, \$21.00
 Dust Shot, 5-b bag, \$21.00
 Shovels and Spades—
 Ames' Shovels, Spades, &c., List Nov. 1, 1888, \$21.00
 Note—Jobbers frequently give 5% extra on above.
 Griffith's Black Iron, \$21.00
 Griffith's C. S., \$21.00
 Griffith's Solid C. S. R. R. Goods, \$21.00
 St. Louis Shovel Co., \$21.00
 Hussey, Binns & Co., \$21.00
 Hubbard & Co., \$21.00
 Lehigh Mfg. Co., \$21.00
 H. M. Myers Co., \$21.00
 Payne Petebone & Son, \$21.00
 Remington's (Lowman's) Pat., \$21.00
 Rowland's, Black Iron, \$21.00
 Rowland's Steel, \$21.00
 Shovels and Tongs—
 Iron Head, \$21.00
 Brass Head, \$21.00
 Sieves—
 Mann's Tin Rim, \$21.00
 Buffalo Metallic, S. S. & Co., \$21.00
 Shaker (Barber's) Pat., Flour Sifters, \$21.00
 Electric, \$21.00
 A. & W. Butters, \$21.00
 Hunter's, \$21.00
 Smith's Adjustable Sifters, \$21.00

Smith's Adjustable Milk Strainer, \$21.00
 Smith's Adjustable T. & C. Strainer, \$21.00
 Sieves, Wooden Rim—
 Mesh 18, Nested, \$21.00
 Mesh 20, Nested, \$21.00
 Mesh 24, Nested, \$21.00
 Skelins, Thimble—
 Western List, \$21.00
 Columbus Wrt. Steel, Special net prices
 Coldbrookdale Iron Co., \$21.00
 Seneca Falls Pattern, \$21.00
 Utica P. S. T. Skelins, \$21.00
 Utica Turned and Fitted, \$21.00
 Slates—
 School, by case, \$21.00
 Snaps, Harness, &c.—
 Anchor (T. & S. Mfg. Co.), \$21.00
 Fitch's (Bristol), \$21.00
 Hotchkiss, \$21.00
 Andrews, \$21.00
 Sargent's Patent Guarded, \$21.00
 German, new list, \$21.00
 Covert, New Patent, \$21.00
 Covert, New R. E., \$21.00
 Covert Spring, \$21.00
 Snaths, Scythe.
 List, \$21.00
 Soldering Irons—See Irons, Soldering.
 Splitters, Cupliders, &c.—
 Standard Fibreware—
 Cupliders, 5 1/2-inch, \$21.00
 No. 5, \$21.00
 No. 6, \$21.00
 Splitters, Daisy, 5-inch, No. 1, \$21.00
 and 11 inch, \$21.00
 Spoke Shaves—See Shaves, Spoke.
 Spoke Trimmers—See Trimmers, Spoke.
 Spoons and Forks—
 Tinned Iron—
 Basting, Cen. Stamp, Co.'s list, \$21.00
 Solid Table and Tea, Cen. Stamp, Co.'s, \$21.00
 Buffalo S. S. & Co., \$21.00
 Silver-Plated—(4 mos. or 5¢ cash 30 days).
 Meriden Brit. Co., Rogers, \$21.00
 C. Rogers & Bros., \$21.00
 Rogers & Bro., \$21.00
 Reed & Barton, \$21.00
 Wm. Rogers Mfg. Co., \$21.00
 Stumpson's, \$21.00
 Holmes & Edwards Silver Co., \$21.00
 Boardman's, \$21.00
 No. 67 Mexican Silver, \$21.00
 No. 30 Silver Metal, \$21.00
 No. 24 German Silver, \$21.00
 No. 50 Nickel Silver, \$21.00
 No. 49 Nickel Silver, \$21.00
 Wm. Rogers Mfg. Co., \$21.00
 Rogers' Silver Metal, \$21.00
 Rogers' German Silver, \$21.00
 Rogers' Nickel Silver, \$21.00
 German Silver, \$21.00
 German Silver, Hall & Elton, \$21.00
 Nickel Silver, \$21.00
 Britannia, \$21.00
 Boardman's, \$21.00
 Boardman's Britannia, \$21.00
 Boardman's Britannia, \$21.00
 Springs—
 Door—
 Torrey's Rod, regular size, \$21.00
 Gray's, \$21.00
 Bee Rod, \$21.00
 Warner's No. 1, \$21.00
 Gen (Coll), List April 19, 1888, \$21.00
 Star (Coll), List April 19, 1888, \$21.00
 Victor (Coll), \$21.00
 Champion (Coll), \$21.00
 Philadelphia, 5 in., \$21.00
 Cowl's, \$21.00
 Rubber, complete, \$21.00
 Hercules, \$21.00
 Shaw Door Check and Spring, \$21.00
 Carriage, Wagon, &c.—
 Elliptic, Concord, Platform and Ball, \$21.00
 Cliff's Bolster Springs, \$21.00
 Squares—
 Steel and Iron, \$21.00
 Nickel-Plated, \$21.00
 Try Square and T Bevels, \$21.00
 Diaston's Try Square and T Bevels, \$21.00
 Winterbottom's Try and Miter, \$21.00
 Starrett's Micrometer Calliper Squares, \$21.00
 Avery's Flush Bevel Squares, \$21.00
 Avery's Bevel Protractor, \$21.00
 Squeezers—
 Fodder—
 Blair's, \$21.00
 Blair's "Climax", \$21.00
 Lemon—
 Porcelain Lined, No. 1, \$21.00
 Wood, No. 2, \$21.00
 Wood, Common, \$21.00
 Dunlap's Improved, \$21.00
 Sammis, No. 1, \$21.00
 Jennings' Star, \$21.00
 The Boss, \$21.00
 Dean's, No. 1, \$21.00
 Little Giant, \$21.00
 King, \$21.00
 Hotchkiss Straight Flash, \$21.00
 Silver & Co., Glass, \$21.00
 Standard Fiber Ware—See Ware, Standard Fiber.
 Staples—
 Blind—
 Barbed, 1/2 in. and larger, \$21.00
 Barbed, 1/4 in., \$21.00

Fence staples, Galvanised, Same price
 Fence Staples, Plain, See Tr. Rep.
 Steelyards, \$21.00
 Stocks and Dies—
 Blacksmith's
 Waterford Goods, \$21.00
 Butterfield's Goods, \$21.00
 Lightning Screw Plate, \$21.00
 Reece's New Screw Plates, \$21.00
 Reversible Ratchet, \$21.00
 Gardner, \$21.00
 Steps, Bench.
 Morrill's, \$21.00
 Hotchkiss's, \$21.00
 Weston's, No. 1, \$21.00
 Morrill's, \$21.00
 Cincinnati, \$21.00
 Stone—
 Hindostan No. 1, \$21.00
 Sand Stone, Extra, \$21.00
 Washita Stone, No. 1, \$21.00
 Washita Stone, No. 2, \$21.00
 Washita Slips, No. 1, Extra, \$21.00
 Washita Slips, No. 1, \$21.00
 Arkansas Stone, No. 1, \$21.00
 Turkey Oil Stone, 4 to 8 in., \$21.00
 Turkey Slips, \$21.00
 Lake Superior, Chase, \$21.00
 Lake Superior Slips, Chase, \$21.00
 Seneca Stone, Red Paper Brand, \$21.00
 Seneca Stone, High Rounds, \$21.00
 Seneca Stone, Small Whets, \$21.00
 Stove Polish—See Polish, Stove.
 Stretchers, Carpet.
 Cast Steel, Polished, \$21.00
 Cast Iron, Steel Point, \$21.00
 Socket, \$21.00
 Jullard's, \$21.00
 Straps, Razor—
 Genuine Emerson, \$21.00
 Imitation, \$21.00
 Torrey's, \$21.00
 Badger's Belt and Com., \$21.00
 Lamont Combination, \$21.00
 Jordan's Pat. Padded, List Nov. 1, 1890, \$21.00
 Electric, List net
 Stuffers or Fillers, Sausage—
 Miles' "Challenge", \$21.00
 Perry, \$21.00
 Draw Cut No. 4, each \$21.00
 Enterprise Mfg. Co., \$21.00
 Sweepers, Carpet.
 Bissell No. 5, \$21.00
 Bissell No. 7 New Drop Pan, \$21.00
 Bissell, Grass, \$21.00
 Grand Rapids, \$21.00
 Crown Jewel, No. 1, \$21.00
 Magic, \$21.00
 Jewel, \$21.00
 Improved Parlor Queen, \$21.00
 Nicked, \$21.00
 Janned, \$21.00
 Excelsior, \$21.00
 Garland, \$21.00
 Parlor Queen, \$21.00
 Housewife's Delight, \$21.00
 Queen, \$21.00
 Queen, with band, \$21.00
 King, \$21.00
 Weed, Improved, \$21.00
 Hub, \$21.00
 Cog-Wheel, \$21.00
 Easy, \$21.00
 Monarch, \$21.00
 Goshen, \$21.00
 Ladies' Friend, \$21.00
 Advance, \$21.00
 Supreme, \$21.00
 Tacks, Brads, &c.—
 List Oct. 19, 1889. Standard Weights.
 Carpet Tacks—
 American Iron, Blued, \$21.00
 Am. Iron, Tin'd or Cop'd., \$21.00
 Steel, Plain or Bright, \$21.00
 Steel, Tinned or Coppered, \$21.00
 Swedes Iron, Blued, \$21.00
 Swedes Iron, Tinned or Cop'd., \$21.00
 American Iron, Tin'd or Cop'd., \$21.00
 Swedes Ir. Uphol's T. Ks., \$21.00
 Swedes Iron Upholsters' Tacks, \$21.00
 Tinned, \$21.00
 Gimp and Lace Tacks, \$21.00
 Gimp and Lace Tacks, Tin'd, \$21.00
 Swedes Iron Basket or Trimmer, \$21.00
 Miers' Tacks, \$21.00
 Bill-Posters' or RR. Tacks, \$21.00
 Bill-Posters' or Railroad Tacks, \$21.00
 Tinned, \$21.00
 Copper Tacks, \$21.00
 Copper Finish, & Trunk Nails, \$21.00
 Cigar Box Nails, \$21.00
 Zinc Glaziers' Points, \$21.00
 Picture-Frame Points, \$21.00
 Looking-Glass Tacks, \$21.00
 Brush Tacks, \$21.00
 Tin-Capped Trunk Nails, \$21.00
 Finishing Nails, \$21.00
 Trunk and Clout Nails, \$21.00
 Tinned, \$21.00
 Common and Patent Brads, \$21.00
 Hunzarian Nails, \$21.00
 Basket and Chair Nails, \$21.00
 Leathered Carpet Tacks, \$21.00
 Miscellaneous—
 Double-Pointed, 180 count, \$21.00
 Wire Carpet Nails, \$21.00
 Plymouth Rock Steel Carpet Tacks, \$21.00

Wire Brads & Nails, see Nails, Wire.
Steel-Wire Brads, R. & E. Mfg. Co.'s
list.....50&10&5

Tapes, Measuring—

American.....40&40&5
Spring.....40&5
Chesterman's, Regular list.....30&30&5

Thermometers—

Tin Case.....80&80&10&5

Thimble Skeins—See Skeins.

Ties, Bale—Steel

Standard Wire, list.....50&10&5

Tinners' Shears, &c.—See Shears, Tinners', &c.

Tinware—

Stamped, Japanned and Piced, list
Jan. 20 1887.....70&10&70&10&5

Tire Benders, Upsetters, &c.— See Benders and Upsetters, Tire.

Tools.

Coopers'—

Bradley's.....20&20&5
Barton's.....30&30&5
L. & J. White.....20&20&5
Albertson Mfg. Co.....20&20&5
Beatty's.....30&30&5
Sandusky Tool Co.....30&30&5
Shaves, Cincinnati Tool Co.....20&20&5

Lumber.

Ring Peavies, "Blue Line".....\$ dos 20.00
Ring Peavies, Common.....\$ dos 18.00
Steel Socket Peavies.....\$ dos 21.00
Mail Iron Socket Peavies.....\$ dos 19.00
Cant Hooks, "Blue Line".....\$ dos 16.00
Cant Hooks, Common Finish.....\$ dos 14.00
Cant Hooks, Mail, Socket Clasp, "Blue
Line" Finish.....\$ dos 16.00
Cant Hooks, Mail, Socket Clasp, Common
Finish.....\$ dos 14.00
Cant Hooks, Clip Clasp, "Blue Line"
Finish.....\$ dos 14.00
Cant Hooks, Clip Clasp, Common Fin-
ish.....\$ dos 12.00
Ish.....\$ dos 12.00
Band Spikes.....\$ dos 6 ft., 15.00; 8 ft.,
20.00

Pike Poles, Pike & Hook, \$ dos, 12 ft.,
\$11.50; 14 ft., \$12.50; 16 ft., \$14.50;
18 ft., \$17.50; 20 ft., \$21.50.
Pike Poles, Pike only, \$ dos, 12 ft.,
\$10.00; 14 ft., \$11.00; 16 ft., \$13.00; 18
ft., \$16.00; 20 ft., \$20.00.
Pike Poles, not ironed, \$ dos, 12 ft.,
\$6.00; 14 ft., \$7.00; 16 ft., \$9.00; 18
ft., \$12.00; 20 ft., \$16.00.
Setting Poles, \$ dos, 12 ft., \$14.00; 14
ft., \$15.00; 16 ft., \$17.00.
Swamp Hooks.....\$ dos 18.00

Saw.

Atkins' Perfection.....\$ dos 12.00
Atkins' Excelsior.....\$ dos 16.00
Atkins' Giant.....\$ dos 4.00

Tobacco Cutters—See Cutters, To- bacco.

Transom Lifters—See Lifters, Transom.

Traps—

Game—

Newhouse.....40&40&5
Ondela Pattern.....70&10&5
Game, Blake's Patent.....40&10&5

Mouse and Rat—

Mouse Wood, Choker, \$ dos holes, 11&12
Mouse, Round Wire.....\$ dos 1.50, 10
Mouse, Cage, Wire.....\$ dos 2.50, 10
Mouse, Catch-em-alive.....\$ dos 2.50, 15
Mouse, Bonanza.....\$ dos 20.00, 10
Rat, Decoy.....\$ gr 10.00, 10
Ideal.....\$ gr 10.00, 10
Cyclone.....\$ gr 10.00, 10
Hotchkiss Metallic Mouse, 5-hole traps,
\$ dos, 90¢; in full cases, \$ dos.....75¢
Hotchkiss Imp. Rat Killer.....\$ gr 18.50
Hotchkiss New Rat Killer.....\$ gr 16.50
Schuyler's Rat Killer.....\$ gr 16.00

Trimmers.

Butter and cheese.....25¢

Trimmers, Spoke.

Bonner's.....\$ dos 10.00, 50¢
Stearns.....\$ dos 10.00, 50¢
Ives, No. 1, \$12.00; No. 2, \$12.00 \$ dos.
55&10
Douglas.....\$ dos 10.00, 20¢
Cincinnati.....\$ dos 10.00, 25¢

Trowels—

Lothrop's Brick and Plastering.....
20&10&5 35¢
Reed's Brick and Plastering.....15¢
Dixton's Brick and Plastering.....25¢
Pease's Plastering.....25¢
Clement & Maynard's.....20¢
Rose's Brick.....15¢
Bradley's Brick.....25¢
Worrall's Brick and Plastering.....20¢
Garden.....70¢

Trucks, Warehouse, &c.—

B. & L. Block Co.'s list, '88.....40¢

Tubes, Boiler—

See Pipe.

Twine—

Flax Twine.....BC B.
No. 9, 10 and 11 B Balls.....26¢ 34¢
No. 12, 14 and 16 B Balls.....26¢ 33¢
No. 18, 20 and 22 B Balls.....22¢ 32¢
No. 24, 26 and 28 B Balls.....22¢ 32¢
No. 30, 32 and 34 B Balls.....20¢ 31¢
No. 36, 38 and 40 B Balls.....18¢ 29¢
Chalk Line, Cotton, 1/2 B Balls.....25¢
Mason Line, Linen, 1/2 B Balls.....25¢
2-Ply Hemp, 1/2 and 3/4 B Balls (Spring
Twine).....15¢
3-Ply Hemp, 1 B Balls.....15¢
Cotton Wrapping, 5 Balls to a lb.....15¢
2, 3, 4 and 5-Ply Jute, 1/2 B Balls.....10¢
Wool.....6¢
Paper.....15¢
Cotton Mops, 6, 9, 12 and 15 lb to dos.....18¢

Vises—

Solid Box.....50&10&50&10&5
Parallels—
Fisher & Norris Double Screw.....15&10¢
Stephens.....25¢
Parker's.....20¢
Wilson's.....55¢
Howard's.....40¢
Bonney's.....40&10¢
Miller's Falls.....40&10¢
Trenton.....40&10¢
Merrill's.....40&10¢
Sargent's.....40&10¢
Backus and Union.....40¢
Double Screw Leg.....15&10¢
Prentiss's Adjustable.....20¢
Simpson's Adjustable.....40¢
Moore's.....40¢
Massey Quick Action.....20¢
Saw Vises—
Bonney's, Nos. 2 & 3, \$15.00.....40&10¢
Stearns.....33¢
Stearns' Silent Saw Vises.....33¢

Sargent's.....60¢
Hopkins.....\$ dos 17.50, 10¢
Reading.....40&10¢
Wentworth.....30&10¢

Miscellaneous.

Combination Hand Vices.....\$ gr 42.00
Cowell Hand Vices.....20¢
Bauer's Pipe Vices.....10¢
Incinatti.....25&10¢
Enterprise Pipe Vices, each.....\$3.00
Massey Combination Pipe.....40¢

Wagon Boxes—See Boxes, Wagon.

Washer Cutters—See Cutters, Washer.

Wagon Jacks—See Jacks, Wagon.

Ware, Hollow, Enameled, &c.

Cast Iron, Hollow—
Stove Hollow-Ware.....60&10¢
Ungrout.....60&10¢
White Enameled-Ware.....
Mashin Kettles.....70¢
Boilers and Saucepans.....40&10¢
Tinned Boilers and Spans.....40&10¢
Rustless Hollow-Ware.....50&10¢
Gray Enameled-Ware—
Stove.....60¢
Mashin Kettles.....60&10¢
Boilers and Saucepans.....40&10¢
Enameled—
Agate and Granite Ware, list Jan. 1,
1889.....33¢
Ironclad Enameled Ware.....33¢

Galvanized Tea-Kettles—

Inch.....6 7 8 9
Each.....55¢ 60¢ 65¢ 75¢

Standard Fiber—

Wash-Basins, 10 1/2 in.....\$2.00
Wash-Basins, 12 in.....2.25
Keelers, 11 1/2 in.....4.00
Kuspidors.....4.00
Spittoons, "Bait" 2 1/2 in.....4.50
Peck Measure.....4.00
Half-peck Measure.....3.50

Indurated Fiber—25¢

Spittoons, No. 2, \$ dos.....\$9.00
Basins, Ringed, \$ dos, No. 2, \$4.80;
No. 3.....\$4.20
Washbuds, Nested, Nos. 0, 1, 2 and 3 (4
pieces), \$ nest.....\$7.50
Keelers, Nested, Nos. 1, 2, 3 and 4 (4
pieces), \$ nest.....\$3.70
Butter Bowls, 15, 17 and 19-inch (3
pieces), \$ nest.....\$2.25
Liquid Measures, pt., qt., 2 qt. and fun-
nel (4 pieces), \$ set.....\$3.00
Dry Measures, 1/2, 1, 2, 3 and 4 qt (5
pieces), \$ set.....\$3.00

See also Patls.

Silver Plated, Hollow—

4 mo. or 5 1/2 cash in 30 days.
Reed & Barton.....
Warden Brittain Co.....40&10¢
Simpson, Hall, Miller & Co.....40&10¢
Rogers & Brother.....40&10¢
Hartford Silver Plate Co.....40&10¢
William Rogers Mfg. Co.....40&10¢

Washers—

Rise holes.....5-16 3/4 1/2 to 1 1/2
Washers.....5 8.50¢ 3
In lots less than 200 B, \$ B, add 1/4¢, 5-B
boxes 1¢ to list.

Wedges—

Iron.....\$ B 3 1/4¢
Steel.....\$ B 3 1/4¢

Weights, Sash—

Solid Eyes.....\$ ton 112&119

Well Buckets, Galvanized—See

Buckets, Well, Galvanized.

Wheels, Well.

8 in., \$2.25; 10 in., \$2.70; 12 in., \$3.30

Wire and Wire Goods—

Iron—

Market.
Br. & Ann., Nos. 0 to 18.....77 1/2¢
Cop'd, Nos. 0 to 18.....75¢
Galv., Nos. 0 to 18.....67 1/2¢
Tin'd, Tinned list Nos. 0 to 18.....67 1/2¢

Steel—

Br. & Ann'd, Nos. 16 to 18.....77 1/2¢
Bright and Ann'd, Nos. 19 to 26.....80¢
Br. & Ann'd, Nos. 27 to 36.....82 1/2¢
Tinned
Tinned Broom Wire, 18 to 21, \$.....5¢
Galvanized Fence, Nos. 8 and 9.....70¢
Annealed Fence, Nos. 8 and 9.....70¢
Annealed Grape, Nos. 10 to 14.....80¢
Brass, list Jan. 13, 1884.....35¢
Copper, list Jan. 13, 1884.....35¢
Barb Fence.....See Trade Report
Annealed Wire on Spools.....50¢
Mallin's Steel and Tin'd on Spools.....50¢
Mallin's Brass and Cop. on Spools.....45¢
Tate's Spooled, Tinned and Annealed.....45¢
Tate's Spooled Cop. and Brass.....45¢
Cast Steel Wire.....5¢
Stub's Steel Wire.....\$6.00 to 2, 3¢
Steel Music Wire, 15 to 30.....60¢ to 70¢
Wire Clothes Lines, see Lines.
Wire Picture Cord see cord.

Bright Wire Goods—

Standard list.....30&10¢

Wire Cloth and Netting.

Painted Screen Cloth, good quality,
\$ 100 sq ft., \$1.40
Galvanized Wire Netting.....70&10¢ to 75¢

Wire Rope—See Rope, Wire.

Wrenches—

American Adjustable.....40¢
Baxter's Adjustable "S".....40&10¢
Baxter's Diagonal.....40&10¢
Coe's "Mechanics".....50¢
Girard Standard.....65&10¢
Lamson & Sessions' Engineers.....60&10¢
Lamson & Sessions' Standard.....70&10¢
P. S. & W. Agricultural.....75¢
Girard Agricultural.....\$10
Lamson & Sessions' Agri'l.....\$10
Bemis & Call's
Pat. Combination.....30¢
Merrick's Pattern.....30¢
Brigg's Pattern.....20¢
Cylinder or Gas Pipe.....40&10¢
No. 3 Pipe.....\$6.00
Allen's Pocket (Bright).....\$6.00
The Favorite Pocket.....\$ dos 4.00, 40¢
Webster's Pat. Combination.....25¢
Boardman's.....30&10¢
Always Ready.....25¢
Alligator.....50¢
Donohue's Engineer.....50¢
Acme, Bright.....50&10¢
Acme, Nickle'd.....40&10¢
Hercules.....70¢
Walker's.....55&10¢
Diamond Steel.....55&10¢
Cincinnati Brace Wrenches.....55&10¢
Taft's Vise Wrench.....55&10¢

Wringers, Clothes—

List September 20, 1890, 2¢ cash.

Wrought Goods—

Staples, Hooks, &c., list Jan. 12, 1889.
\$5&10 to \$10

PAINTS, OILS AND COLORS.—Wholesale Prices.

Animal and Vegetable Oils.

Linseed, City, raw, per gal. 57 62
Linseed, City, boiled.....60 65
Linseed, Western, raw.....57 62
Lard, City, Extra Winter.....57 62
Lard, City, Prime.....57 62
Lard, City, Extra No. 1.....45 47 1/2
Lard, City, No. 1.....40 43 1/2
Lard, Western, prime.....55 65
Cotton-seed, Crude, prime.....38 43
Cotton-seed, Crude, off
grades.....25 30
Cotton-seed, Summer Yel-
low, prime.....40 41
Cotton-seed, Summer Yel-
low, off grades.....32 38
Sperm, Crude.....72 78
Sperm, Natural Spring.....72 78
Sperm, Bleached Spring.....72 78
Sperm, Natural Winter.....72 78
Sperm, Bleached Winter.....72 78
Whale, Crude.....55 65
Whale, Natural Winter.....54 58
Whale, Bleached Winter.....54 58
Whale, Extra Bleached.....58 60
Sea Elephant, Bleached
Winter.....63 64
Menhaden, Crude, Sound.....25 27
Menhaden, Crude, Southern.....25 27
Menhaden, Light Pressed.....29 30
Menhaden, Bleached W'ter.....31 32
Menhaden, Extra Bleached.....33 35
Tallow, City, prime.....44 45
Tallow, Western, prime.....44 45
Cocoanut, Ceylon.....64 67
Cocoanut, Ceylon.....64 67
Cod, Domestic.....48 45
Cod, Foreign.....48 45
Red Elaine.....38 38
Red Saponified.....44 44
Bank.....27 28
Strait.....28 29
Olive, Italian, bbls.....72 72
Neatsfoot, prime.....55 65
Palm, prime, Lagos.....6 6 1/2

Mineral Oils.

Black, 20 gravity, 25 @ 80
cold test.....per gal
Black, 20 gravity, 15 cold
test.....8 1/4 @ 9
Black, 20 gravity, summer
test.....6 1/4 @ 7
Cylinder light, filtered.....15 @ 20

Cylinder, dark, filtered.....12 @ 15
Cylinder, dark, st'm refined.....10 @ 18
Paraffine, 25 gravity.....12 1/2 @ 12
Paraffine, 28 gravity.....12 1/2 @ 12
Paraffine, 32 gravity.....9 1/2 @ 10
Paraffine, red, 21 @ 22 grty.....9 @ 10
Paraffine, red, 23 @ 23 grty.....13 @ 14

Paints and Colors.

Barytes, Foreign, \$ ton.....\$24.00
Barytes, Amer. floated.....30.00
Barytes, Amer. No. 1.....19.00
Barytes, Amer. No. 2.....13.00
Barytes, Amer. No. 3.....11.00
Blue, Celestial.....\$ B 6 @ 8
Blue, Chinese.....50 @ 55
Blue, Prussian.....25 @ 40
Blue, Ultramarine.....\$ B 25
Brown, Spanish.....1/2 @ 1
Brown, Vandyke, Amer.....3 @ 3 1/2
Brown, Vandyke, English.....6 @ 8
Carmine, No. 40, in bulk, 3.10 @ ..
Carmine, No. 40, in boxes
or barrels.....3.20 @ ..
Carmine, No. 40, in ounce
bottles.....4.20 @ ..
Chalk, in bulk.....2.75 @ 3.00
Chalk, in bbls., \$ 100 B.....83 @ 40
China Clay, English.....\$ ton 13.00 @ 15.00
Cobalt Oxide, prep'd.....2.90 @ ..
Cobalt Oxide, black.....lots 100 B 2.00 @ ..
Cobalt, Oxide, black.....less 100 B 2.00 @ ..
Green, Paris, in bulk.....14 @ 15 1/2
Green, Paris, 170 @ 175 B.....14 1/2 @ 15 1/2
Kegs.....14 1/2 @ 15 1/2
Green, Paris, small pack.....16 @ 21 1/2
Green, Chrome, ordinary.....8 @ 11
Green, Chrome, pure.....22 @ 25
Lead, Eng., B.B. white.....8 1/2 @ 10
Lead, Amn. White, dry or in oil:
Kegs, lots less than 1000 B.....7 1/4 @ 7 1/2
Kegs, lots 1000 B to 5 tons.....6 1/2 @ 6 1/2
Kegs, lots 5 tons to 13 tons.....6 1/2 @ 6 1/2
Kegs, lots 13 tons and over.....6 1/2 @ 6 1/2
Lead, White in oil, 25 B tin
pails, add to keg price.....\$ 1/4
Lead, White, in oil, 12 1/2 B tin
pails, add to keg price.....\$ 1

Lead, White, in oil, 1 to 5 B as-
sorted tins, add to keg price.....\$ 2 1/2 @ 7
Lead, Red, bbls. and 1/2 bbls.....6 1/4 @ 7
Lead, Red, kegs.....8 1/4 @ 7 1/2
Litharge, kegs.....6 1/4 @ 7 1/2
Litharge, bbls. and 1/2 bbls.....6 1/4 @ 7
Terms, &c.—Lead and Litharge—On
lots of 1000 B or over, 60 days' time or
2 1/2 % discount for cash if paid within 15
days of date of invoice.
Ocher, French Washed.....1.25 @ 1 1/4
Ocher, French Washed.....1 1/4 @ 1 1/2
Ocher, German Washed.....1 1/4 @ 1 1/2
Ocher, American.....1 1/4 @ 1 1/2
Orange Mineral, English.....9 @ 9 1/2
Orange Mineral, French.....10 @ 10 1/2
Orange Mineral, German.....9 1/2 @ 10
Paris White, English Cliff.....5 @ 5 1/2
Paris White, American.....1.00 @ 1.15
Paris White, American.....70 @ 75
Red, Indian, English.....5 1/2 @ 7
Red, Indian, American.....2 @ 2 1/2
Red, Turkey.....9 @ 14
Red, Tuscan.....9 @ 11
Red, Venetian, English.....\$ 100 B 1.00 @ 1.25
Sienna, Italian, Burnt and
Powd.....5 @ 6 1/2
Sienna, Ital., Burnt Lumps.....14 1/2 @ 15
Sienna, Ital., Raw, Powd.....5 @ 6 1/2
Sienna, Ital., Raw Lumps.....3 @ 3 1/2
Sienna, American, Raw.....14 1/2 @ 15
Sienna, American, Burnt
and Powdered.....14 1/2 @ 15
Talc, French.....1 1/2 @ 1 1/2
Terra Alaba, Fr'ch, \$ 100 B.....90 @ 1.00
Terra Alaba, English.....60 @ 60
Terra Alaba, American No. 1.....70 @ 75
Terra Alaba, American No. 2.....40 @ 60
Umber, Turkey, Bnt. and
Powd.....3 1/4 @ 4
Umber, Turkey, Bnt. and
Powd.....3 1/4 @ 3
Umber, Turkey, Fr'w Lumps.....24 @ 24
Umber, Turkey, Fr'w Lumps.....14 @ 14
Umber, Turkey, Fr'w Amer.....14 @ 14
Yellow, Chrome.....10 @ 25
Vermilion, American, Lead.....11 1/4 @ 17
Vermilion, Quicksilver, bulk.....64 @ 66
Vermilion, Quicksilver, bags.....65 @ 67
Vermilion, Quicksilver,
smaller pkgs.....60 @ 71
Vermilion, English imp'wt.....80 @ 88

Vermilion, imitation, Eng. 8 @ 25
Vermilion, Trieste.....87 1/2 @ 90
Vermilion, Chinese.....90 @ 95
Whiting, Common, \$ 100 B.....40 @ 45
Whiting, Gliders.....50 @ 55
Zinc, American, dry.....4 1/2 @ 5
Zinc, French, Red Seal.....\$ B 8 1/2 @ 8 1/2
Zinc, French, Green Seal.....\$ B 8 1/2 @ 8 1/2
Zinc, French, V. M. X.....\$ B 7 @ 7
Zinc, Antwerp, Red Seal.....\$ B 5 1/2 @ 5 1/2
Zinc, Antwerp, Green Seal.....\$ B 5 1/2 @ 5 1/2
Zinc, German, L. Z. O.....\$ B 6 1/2 @ 6 1/2
Zinc, V. M. in Poppy Oil, G.
Seal, lots of 1 ton and
over.....10 1/2 @ 11 1/2
lots less than 1 ton.....11 @ 11 1/2
Zinc, V. M. in Poppy Oil,
Red Seal.....lots of 1 ton and over.....10 @ 10 1/2
lots less than 1 ton.....10 1/2 @ 10 1/2
Discounts—French Zinc—Discounts
to buyers of 10-bbl. lots of one or as-
sorted grades, 1 1/2 %; 25 bbls, 2 1/2 %; 50 bbls,
4 %; No discount allowed on less
than bbl. lots.

Colors in Oil.

Blue, Chinese.....\$ B 25 @ 40
Blue, Prussian.....29 @ 45
Blue, Ultramarine.....12 @ 18
Brown, Vandyke.....7 @ 12
Green, Chrome.....8 @ 13
Green, Paris.....16 @ 18 1/2
Sienna, Raw.....7 @ 14
Sienna, Burnt.....7 @ 14
Umber, Raw.....7 @ 10
Umber, Burnt.....7 @ 10

Putty.

In wooden pails......01 1/4 @ ..
In tin cans......02 @ .02 1/4
In bladders......02 @ .02 1/4

Spirits Turpentine.

In regular bbls.....39 1/4 @ ..
In machue bbls.....39 1/4 @ ..

Glue.

Low Grade.....\$ B 8 @ 10
Cabinet.....12 @ 14
Medium White.....12 @ 15
Extra White.....17 @ 20
French.....10 @ 22
English.....10 @ 15
Irish.....12 @ 15

CURRENT METAL PRICES.

JUNE 3, 1891.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports

IRON AND STEEL.

Bar Iron from Store.

Common Iron:	
1/2 to 2 in. round and square...	2.00 @ 2.10
1 to 6 in. x 1/2 to 1 in.	
Refined Iron:	
1/2 to 2 in. round and square...	2.10 @ 2.30
1 to 4 in. x 1/2 to 1 in.	
4 1/2 to 6 in. x 1/2 to 1 in.	2.30 @ 2.50
1 to 6 in. x 1/2 and 5-16	2.20 @ 2.40
Rods—1/2 and 11-16 round and sq.	2.40 @ 2.60
Bands—1 to 6 x 3-16 to No. 12.	2.40 @ 2.60
"Burden Best" Iron, base price.	3.00
Burden's "H. B. & S." Iron, base price.	2.80
"Ulster"	3.00
Norway Bars	4.00
Norway Shapes	5.00

Merchant Steel from Store.

Open-Hearth and Bessemer Machinery,	
Toe Calk, Tire and Sleigh Shoe, base price in small lots.	2 1/2
Best Cast Steel, base price in small lots	5
Best Cast Steel Machinery, base price in small lots.	5 1/2

Sheet Iron from Store.

	Common American.	R. G.	Cleaned.
10 to 16.	3.00 @ 3.00	3.35	2.75
17 to 20.	3.15 @ 3.25	3.35	2.75
21 to 24.	3.35 @ 3.35	3.60	2.75
25 and 26.	3.35 @ 3.35	3.60	2.75
27.	3.50 @ 3.62 1/2	3.85	2.75
28.	3.65 @ 3.65	4.10	2.75
Galv'd, 14 to 20.	4.75 @ 4.60	5.00	2.75
Galv'd, 21 to 24.	5.12 @ 5.00	5.35	2.75
Galv'd, 25 to 26.	5.50 @ 5.70	5.70	2.75
Galv'd, 27.	6.30 @ 6.10	6.10	2.75
Galv'd, 28.	6.35 @ 6.10	6.10	2.75
Patent Planchet.	10 1/2 @ 10 1/2	11 1/2	2.75
Russia.	10 1/2 @ 10 1/2	11 1/2	2.75
American Cold Rolled B.	5 1/2 @ 5 1/2	5 1/2	2.75
Orang Polished Sheet Steel.	5 1/2 @ 5 1/2	5 1/2	2.75

English Steel from Store.

Best Cast.	15
Extra Cast.	16 1/2
Swaged Cast.	16
Best Double Shear.	15
Blister, 1st quality.	12
German Steel, Best.	10
8d quality.	9
Sheet Cast Steel, 1st quality.	15
8d quality.	14
8d quality.	13 1/2
R. Mushet's "Special".	48
"Titanic".	30

METALS.

Tin.	Per lb.
Banco, Pigs.	23 1/2
Straits, Pigs.	22 1/2
Straits in Bars.	24 1/2

Tin Plates.

Charcoal Plates.—Bright.	Per box.
Melby Grade.	6.50
IC, 10 x 14.	6.75
IC, 12 x 12.	6.50
IC, 14 x 10.	13.20
IC, 14 x 20.	8.00
IC, 12 x 12.	8.25
IC, 14 x 10.	8.00
IC, 12 x 12.	16.00
DC, 12 1/2 x 17.	6.00
DX, 12 1/2 x 17.	7.50
Olland Grade.	6.50
IC, 10 x 14.	6.75
IC, 12 x 12.	6.40
IC, 14 x 10.	7.65
IC, 12 x 12.	8.00
IC, 14 x 10.	7.65
Allaway Grade.	6.15
IC, 10 x 14.	6.30
IC, 12 x 12.	6.15
IC, 14 x 10.	12.00
IC, 12 x 12.	7.30
IC, 14 x 10.	7.30
IC, 12 x 12.	14.50
DC, 12 1/2 x 17.	5.80
DX, 12 1/2 x 17.	6.80

Coke Plates.—Bright.

Steel Coke.—IC, 10 x 14, 14 x 20.	5.70
10 x 20.	7.85
20 x 28.	11.20
IX, 10 x 14, 14 x 20.	6.80
SV Grade.—IC, 10 x 14, 14 x 20.	5.70

Charcoal Plates.—Terne.

Dean Grade.—IC, 14 x 20.	5.45
20 x 28.	10.60
IX, 14 x 20.	6.20
20 x 28.	12.35
Abecarne Grade.—IC, 14 x 20.	5.25
20 x 28.	10.60
IX, 14 x 20.	6.35
20 x 28.	12.35

Tin Boiler Plates.

IXX, 14 x 26.	112 sheets.	\$13.50
IXX, 14 x 28.	112 sheets.	13.75
IXX, 14 x 31.	112 sheets.	15.35

Copper.

Duty: Pig. Bar and Ingot, 1 1/2¢; Old Copper, 1¢
 Manufactured (including all articles of which Copper is a component of chief value), 3 1/2¢ ad valorem.

Ingot.

Lake.	15
Anson's Grade Arizona.	13 1/2
Anson's Grade Casting.	13 1/2

Sheet and Bolt.

Prices adopted by the Association of Copper Manufacturers of the United States, December 5, 1890, being quotations for all sized lots.

Not wider than	Not longer than	Not longer than	Weights per square foot and prices per pound.
Over 64 oz.	Over 64 oz.	Over 64 oz.	Over 64 oz.
30-72.	22	22	22
30-96.	22	22	22
36-96.	22	22	22
48-96.	22	22	22
48-96.	22	22	22
60-96.	22	22	22
60-96.	22	22	22
64-96.	22	22	22
64-96.	22	22	22
Over 84 in. wide	25	27	27

All Bath Tub Sheets. 16 oz. 14 oz. 12 oz. 10 oz.
 Per pound. \$0.27 0.29 0.31 0.35
 Bolt Copper, 1/2 inch diameter and over, per pound. 23 1/2
 Circles, 60 inches in diameter and less, 3 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Copper Bottoms, Pits and Flats.

Per pound.
 14 ounce to square foot and heavier. 26 1/2
 12 ounce and up to 14 ounce to square foot. 27 1/2
 10 ounce and up to 12 ounce. 28 1/2
 Lighter than 10 ounce. 32 1/2
 Circles less than 8 inches diameter 2 cents per pound additional.
 Circles over 18 inches diameter are not classed as Copper Bottoms.

Tinning.

Tinning sheets on one side, 10, 12 and 14 x 48 each. 5¢
 Tinning sheets on one side, 30 x 60 each. 30¢
 For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.), each. 15¢
 For tinning boiler sizes, 8 in. (sheets 14 in. x 60 in.), each. 12¢
 For tinning boiler sizes, 7 in. (sheets 14 in. x 60 in.), each. 10¢
 Tinning sheets on one side, other sizes, per square foot. 2 1/2¢
 For tinning both sides double the above prices.

Planchet Brass and Copper.

14 x 48, 14 x 52, 14 x 56, 14 x 60 in.
 14 and 16 oz. and heavier. 33¢ By the case. 32¢
 12 oz. and lighter. 35¢ By the case. 34¢
 14 x 48 and 50 x 60. 30¢
 14 and 16 oz. and heavier. 30¢

Seamless Brass and Copper Tubes.

O. G.	N. G.	1/2	3/4	1	1 1/4	1 1/2
8-14	6-12	37	33	30	28	27
15	13	38	34	31	30	28
16	14	39	34	32	31	30
17	15	40	35	33	32	31
18	16	41	36	34	33	32
19	17	42	37	35	34	33
20	18-19	43	38	36	35	34
21	20	44	41	39	38	37
22	21	45	42	40	39	38
23	22	46	44	42	41	40
24	23	47	46	44	43	41
25	24	48	49	46	45	43

Copper Bronze and Gilding Tube, 3¢ per lb. additional.

Brass Tubing. (To No. 20, inclusive.)

Above 5-16 inch to 3 inch, inclusive. 35¢
 Plain, above 3 inch. 45¢
 Plain, 5-16 inch. 45¢
 Plain, 1/2 inch. 50¢
 Plain, 3-16 inch. 51¢
 Plain, 1/2 inch. 51¢
 Fancy Tubing, Brass, to No. 20, inclusive. 45¢
 Bronze Tubing, 3¢ per lb. more than Brass.
 Discount from list. 25¢

Roll and Sheet Brass.

(Brown & Sharpe Standard Gauge.)

Common High Brass:	in. 2	in. 10	in. 12	in. 14	in. 16	in. 18	in. 20	in. 22
Wider than and including	10	12	14	16	18	20	22	24
To No. 20, inclusive.	21	22	23	25	27	29	31	33
Nos. 21, 22, 23 and 24.	22	23	24	26	28	30	32	34
Nos. 25 and 26.	22 1/2	23 1/2	24 1/2	27	29	31	33	35
Nos. 27 and 28.	23	24	25	28	30	32	34	36

Common High Brass:	in. 24	in. 26	in. 28	in. 30	in. 32	in. 34	in. 36	in. 38
Wider than and including	26	28	30	32	34	36	38	40
To No. 20, inclusive.	36	39	42	46	50	55	60	65
Nos. 21, 22, 23 and 24.	37	40	43	47	51	56	61	66
Nos. 25 and 26.	38	41	44	48	52	57	62	67
Nos. 27 and 28.	39	42	45	49	53	58	63	68

Brass and Copper Wire.

Old English gauge standard.	Com. high brass. Per lb.	Low brass. Per lb.	Gilding brass & copper. Per lb.
All Nos. to No. 16, inclusive.	\$0.22	\$0.23	\$0.20
No. 17 and No. 18. ....	.23	.27	.21
No. 19 " " 20. ....	.24	.28	.22
No. 21. ....	.25	.29	.23
No. 22. ....	.26	.30	.24
No. 23. ....	.28	.32	.26
No. 24. ....	.30	.34	.28
No. 25. ....	.32	.36	.30
No. 26. ....	.35	.39	.33
No. 27. ....	.38	.42	.36
No. 28. ....	.42	.46	.40
No. 29. ....	.45	.49	.43
No. 30. ....	.48	.52	.46
No. 31. ....	.51	.55	.49
No. 32. ....	.55	.59	.53
No. 33. ....	.59	.63	.57
No. 34. ....	.64	.68	.62
No. 35. ....	.70	.74	.68
No. 36. ....	.76	.80	.74
No. 37.	1.00	1.04	1.00
No. 38.	1.30	1.34	1.26
No. 39.	2.00	2.04	2.00
No. 40.	2.60	2.60	2.60

Spring Wire, 2¢ per lb. advance.

Copper Belt and Hose Rivets and Burrs.	Per lb.	Per lb.
No. 5.	49¢	54¢
No. 6.	49¢	54¢
No. 7.	49¢	54¢
No. 8.	50¢	55¢
No. 9.	52¢	57¢
No. 10.	54¢	59¢
No. 11.	54¢	59¢
No. 12.	54¢	59¢
No. 13.	54¢	59¢
No. 14.	54¢	59¢
No. 15.	54¢	59¢

Tobin Bronze—Rods.

1/4 inch and larger.	18¢ per lb. net
1/2 inch and smaller.	20¢ per lb. net
1 1/4 to 2 1/4 inch.	22¢ per lb. net
2 1/2 inch and larger.	25¢ per lb. net

Tobin Bronze—Piston Rods.

1 1/4 inch and smaller.	20¢ per lb. net
1 1/4 to 2 1/4 inch.	22¢ per lb. net
2 1/2 inch and larger.	25¢ per lb. net

Spelter.

Duty: Pig. Bars and Plates, \$1.50 per 100 lb.
 Western Spelter. 51¢ @ 6¢
 Bertha (pure). 54¢ @ 9¢

Zinc.

Duty: Sheet, 2 1/2¢ per lb.
 600 lb. casks. 64¢
 Per lb. 7 1/2¢

Lead.

Duty: Pig, \$2 per 100 lb. Old Lead, 2¢ per lb. Pipe and Sheets, 2 1/2¢ per lb.
 American. 4 1/2¢ @ 5¢
 Bar. 5¢ @ 5 1/2¢
 Pipe, subject to trade discount. 7¢
 Tin-Lined Pipe, subject to trade discount. 37 1/2¢
 Block Tin Pipes, subject to trade discount. 37 1/2¢
 Sheet, subject to trade discount. 7 1/2¢

Solder.

1/4 @ 1/4 (Guaranteed). 14¢
 No. 1. 12¢
 Extra Wiping. 11 1/2¢ @ 13¢
 The prices of the many other qualities of Solder in the market indicated by private brands vary according to composition.

Antimony.

Cookson. 16¢ @ 16 1/2¢
 Hallett's. 16¢ @ 16 1/2¢

ALUMINUM.

Prices in Ingots.

In lots of 2000 lb. and over. \$1.50

Old Metals.

(Prices Paid in New York.)

Heavy Copper.	19
Light Copper.	11
Heavy Brass.	10
Light Brass.	4
Lead.	3 1/2
Tea Lead.	3
Zinc.	16
No. 1 Pewter.	8
No. 2 Pewter.	8
Wrought Scrap Iron.	12.00
Heavy Cast Scrap.	12.00
Stove Plate Scrap.	8.00
Burnt Iron.	6.00